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Collective Review

FIFTY YEARS' PROGRESS IN SURGERY OF THE HAND

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A REVIEW of the progress made in the past 50 years in surgery of the hand would entail résumés of many of the significant advances made in the fields of plastic surgery, orthopedics, neurosurgery, and the surgical care of wounds. It would deal with numerous anatomic studies and the study of tissue healing, with the care of infections, and the development of antibiotics. Over and above this, it would reflect social, economic, and medical practice changes; changes in attitude on the part of the profession toward a group of surgical conditions of which the importance was only slowly recognized by the laity and profession alike. It would trace the growth of surgery of the hand from that dealing largely with infections alone to that dealing with some of the most complicated procedures. It would trace through a period when hand infections became one of the great problems of surgery and gained the respect and even the fear of the surgeon, to the development of hand surgery as a subspecialty. It would reflect the growth of surgery in general during that period of time, from the anatomic surgery at the beginning of the century, through the period of pathologic dominance, to that of physiology and function. It would pass through a period when the drainage of infections was the most important phase of surgery of the hand, through the early phases of wound repair and reconstruction, always approached with temerity, to the present time when tendon grafts and other reconstructive procedures are carried out with reasonable assurance of success with but little fear of crippling postoperative infection.

The tremendous toll in crippling disability due to infections of the hand and to serious injury has been really appreciated only in the present century. Certainly, it was recognized that the maimed hand was a serious handicap and deplored, but a sympathetic appreciation of this has come only with the increasing elevation of respect for the worker whose livelihood depends upon his hands. Then, too, the usually dim outlook for surgical correction of hand deformities and nerve and tendon injuries led many surgeons to relegate these deformities to the hopeless conditions, among which surgical conditions of the heart were placed until a few years ago.

Obviously, two immediate emergent situations required solution; namely, the acute infection and the acute injury. Not until these were reasonably solved could the surgeon turn his efforts to consideration of reparative and reconstructive surgery.

INFECTIONS

It would be well, therefore, to start a consideration of the development of surgery of the hand with one of these two important situations—infection. It is not without interest to note that the founding of SURGERY, GYNECOLOGY AND OBSTETRICS coincided with, and the early issues contained probably, the most significant contributions to our knowledge of hand infections. I re-

fer, of course, to the publication by Kanavel of his early papers dealing with anatomic, pathologic, and clinical studies of infections of the hand. These studies, based entirely upon personal observation and experiment, and carried directly over into his clinical practice, revolutionized the care of hand infections. The textbook which came from them was a masterpiece of logical presentation. It soon became a "Bible" for the medical profession, and no surgeon was without it. Backing this up and spreading the knowledge of hand infections were the countless talks given by Kanavel all over the country on this subject, for, although Kanavel was a master in many phases of surgery (one of the last of the great general surgeons), his lasting fame will rest on his work with infections of the hand.

One wonders just what advances in the management of infections of the hand have been made since Kanavel's monumental task. True, the development of chemotherapy and, later, of the antibiotics has altered the course of many of the infections, but it has not shaken the basic concepts concerning their spread and localization, and the general principles of care of these infections remain the same. True, the dreaded lymphangitis and the acute spreading infections are usually readily brought under control by the use of the antibiotics, but the surgeon will occasionally be surprised to find that an infection presumably controlled by an antibiotic is due to an organism not sensitive to the drug used. This is not written in disparagement of the antibiotics, for as Meleney has so beautifully demonstrated, the intelligent control of infection is based not only upon an anatomic and pathologic diagnosis of the process, but also upon the identification of the invading organism.

The antibiotics have not abrogated the need for following the general principles of care outlined by Kanavel; namely, rest, elevation, promotion of local resistance to invading bacteria, promotion of general resistance by adequate diets and fluid intake, the avoidance of mechanical interference in the presence of a spreading infection, early drainage of localized processes, especially the felon and tendon sheath infections. There is some indication that in the very early stages the antibiotics may abort many infections; tender and throbbing fingertips may subside overnight under warm moist packs and a dose of penicillin. However, this is not invariable, and more often than not the patient will require a proper incision the next day. It is possible that with the antibiotics one may be able to restrict the size of incisions, for example, in the carbuncle, and that one may permit pulp infections to become more localized than we have been accustomed to doing in the past, an observation strongly supported by work of Bolton *et al.*

Another factor which it seems to me has not been properly assessed in the diminished present day incidence of hand infections has been the greater attention given in industry to injuries. Few large industries are without their medical departments, and these have taken a most commendable position with regard to injury. The great economic importance of wounds of the hand has been appreciated, and these are now generally well cared for. Workers are instructed to report even minor injuries and prompt efficient first aid is usually rendered.

Still another factor, not generally appreciated by us, is the much improved nutritional status of our population and the greater cleanliness of our workers. In this connection, one is struck by some introductory remarks made by Pohl in a small volume on hand infections published in Vienna in 1948. At this time, just following the War, people were very susceptible to hand infections, and they ran an extremely stormy, progressive, and severe course. Pohl attributed this to general worsening of the living and working conditions, poorer nourishment, lowered resistance, increased dirt and filth, and lack of soap. Along with this he noted a breakdown in the repair of tools and the ineptitude of unskilled workers who were, therefore, more susceptible to minor injuries.

Therefore, since Kanavel, the progress in the understanding and management of infections of the hand has been essentially along three lines: (1) in the work of such men as Meleney in insisting on the identification of bacteria and in fitting treatment to the organisms present; (2) in the development of specific agents, chemotherapeutic and antibiotic, to combat bacterial invasion; and (3) the general factors of better care of wounds of the hand, and better general physical and economic status of the worker.

ACUTE INJURIES

The acute injuries of the hands began to receive better treatment only after infections were better understood and after their care was hoisted out of the realm of the neophyte and minor

surgery into that of the experienced surgeon. Curiously enough, reparative surgery of the hand received more serious attention from the surgeon than did the care of the acute open injury in the early part of this era. It is, perhaps, not too difficult to understand why this was so. The acute injury was an emergency; it came at inconvenient hours and frequently at a time when the Chief was busy at some important operation. Also, many hand injuries were industrial injuries, and it took many years for the industrial surgeon to persuade his brother in the profession that he, too, was carrying out a worthy task and was rendering a useful service. The great majority of the acute hand injuries were, therefore, in the hands of young, inexperienced interns and residents, or young, untrained practitioners. Pessimism regarding the development of infections in wounds of the hand, often justified by the high incidence, also deterred the surgeon from attempting immediate operative repair of hand wounds. Many were left open to drain and the initial treatment consisted largely in the pouring in of antiseptic agents.

The disastrous effects of this therapy, not only for wounds of the hand but for wounds everywhere, were seen en masse in World War I. It was not until the close of the War that surgeons began to appreciate the significance of Friedrick's experiments of nearly 30 years before, namely, that excision of contaminated tissue could render a wound surgically clean. It was possibly not entirely realized at that time that wound excision also removed badly damaged tissue and that this factor was of the greatest importance. Anyway, toward the end of this war, surgeons were beginning to carry out wound excision and then, after the lapse of a few days, so-called "delayed primary suture." This procedure, curiously enough, was not carried over into civilian practice. It was not until Koch and Mont Reid started to speak and write about the logical care of open wounds that injuries of the hand began to receive better initial care. The early stages of the campaign by these two surgeons were not easy. It was especially difficult to convince the profession that it was not only unnecessary but actually harmful to introduce antiseptics into wounds. This attitude was a direct outgrowth of Halsted's teachings, namely, that tissue healing depended upon healthy tissues, and that tissues were more damaged by antiseptics than were the bacteria for the control of which the antiseptics were administered. An early significant study, based upon the teachings of these two surgeons, was made by Kerrigan in a large industrial plant. This showed a remarkable drop in post-injury infection, and almost complete success of primary wound closure.

The adoption, then, of the conclusions of Friedrick's experiments and the principles of wound care laid down by Koch and Reid practically revolutionized the care of open wounds of the hand.

Wounds of the hand are no longer soaked with antiseptics, except by the untrained layman, the iodine bottle and mercurochrome are no longer advocated in first-aid cabinets, and even the laity are learning to wash small injuries and cover them with bandaids. For more serious wounds, professional care is sought.

With reasonable assurance of primary healing in wounds seen within the 6 to 8 hour limit of Friedrick, surgeons could then turn attention to problems of deep repair. Here again the precepts of Halsted were of great significance. It was realized that wound healing depended upon healthy tissue; not only antiseptics harmed tissue but mechanical handling as well. At this point, Bunnell came out with his phrase "atraumatic technique." Bunnell's especial interest was in reconstructive surgery; however, his succinct summing up of Halsted's principles of gentle, careful handling of tissues was quickly accepted by all interested in the care of hand injuries. It was soon discovered that the gauze sponge, the large forceps, the heavy ligature, and the hematoma also damaged tissue and delayed healing, just as did devitalized tissue from the injury or the use of antiseptics. With the adoption of this technique, the surgeon found that he could suture acutely divided nerves and tendons in wounds of the hand with reasonable hope of securing primary healing.

The introduction in the past 10 years of the antibiotics has added one further factor of safety to the surgery of acute injuries. But here, as in the management of infections, the antibiotics are adjuncts to care. They are by no means always necessary, but they are certainly a great comfort to the surgeon. They will not make up for sloppy technique or disregard of principles of care. We have learned also that antibiotics are not without danger. Fatalities following their use are recorded, and every surgeon has observed serious sensitivity reactions following their use. The ma-

jority of open wounds of the hand will heal by primary intention if given proper care, without the use of antibiotics.

Another principle of care which was slow to be adopted and adapted has been that of primary closure. The old bugbear of infection, so frequently seen in wounds of the hand, could not be forgotten, and years of patient preaching were required to convince surgeons that, far from inviting infection, closure of wounds was a safeguard against it. Obviously, certain basic principles of care had to be followed to permit closure. Wounds could not be closed willy-nilly, but had to have proper treatment first. They had to be seen reasonably early (within 6 to 8 hours), they had to be properly cleansed mechanically (with soap and water), debris had to be removed, and devitalized tissues had to be excised. Given these criteria, primary closure could be carried out with success. Although this principle of primary closure had been well established before World War II, it could not be followed during this conflict because of certain factors adherent in the combat zone; however, secondary suture was successfully carried out. Today in civilian practice, primary closure of wounds of the hand is a common practice, and only rarely is it omitted.

While primary closure of lacerations and incised wounds was accepted, it took some time before it was realized that open wounds of the hand associated with loss of covering tissues were, likewise, amenable to primary closure. Here two of the technics of plastic surgery, namely, free skin grafts and flaps, were adopted by the general surgeon. The application of free skin grafts in the early part of this century was looked upon as highly specialized surgery undertaken only by a strange breed of creatures known as plastic surgeons and not to be utilized by the general surgeon. Few surgeons in the 1920's knew how to use skin grafts, how to remove them, or how to apply them. Due, however, to the activities and teachings of a few groups of plastic surgeons—Blair and Brown in St. Louis, Davis in Philadelphia, Padgett in Kansas City, Gilles of London, and a few others—the free graft was brought down from its high pedestal to become the property of all surgeons. The development of machines to remove skin grafts (Padgett and others) made graft removal easier, but the important thing was the demonstration of the value of grafts. At first, grafts were used to cover small defects, and at one time there were a number of articles dealing with the covering of traumatic finger amputation stumps with free grafts removed from the forearm. Later, surgeons became bolder, and large cutaneous defects were closed with large grafts of skin.

The use of pedicled or pocket flaps for acute injuries with loss of covering tissues, likewise a procedure learned from the plastic surgeon, was soon seen to be necessary for those open wounds in which bone, tendon, and joint capsule were exposed.

It then was only a short step to the adoption of a third valuable technique, also picked up from the plastic surgeon, i.e., the use of rotation or swing flaps from the hand itself to cover bone, joint, and tendon defects, and covering the donor area with a free graft.

The free graft itself, now a standard product in hand surgery, has undergone many changes in the past 50 years. The old razor-thin graft of Thiersch has been replaced by the thicker, more usable split-thickness graft of Blair and Brown. The pinch grafts and small deep grafts, which served a purpose in the earlier days, have now almost disappeared. The free full-thickness graft, most beautiful of all free skin grafts, is reserved for special cases.

TENDON REPAIR

But, while the general surgeon was learning to cleanse and close wounds of the hand primarily, the battle of deep repair was still waging. Although the results of primary tendon repair, especially of the flexor tendons, were admittedly poor, the reasons for this failure were not too evident. In many instances the wounds became seriously infected and the patient was often fortunate to escape with his life. If severe infection did not supervene, the tendons became densely adherent and functionless or the ends separated. The incisions made to find retracted tendons contracted and led to scar deformities, so that few surgeons were happy about carrying out primary repair, although if divided tendons were seen they felt compelled to repair them.

An early step in the solution of the problem of immediate repair was the establishment, largely by Koch, of certain time limits within which the repair of tendons could be undertaken. The tenets upon which these limits were based referred back to Friedrick again, who demonstrated that bacteria required a certain amount

of time to become acclimated to an environment, in this case, human tissues. Now, while it was possible to close wounds primarily within 6 to 8 hours, somehow tendon tissue seemed more susceptible to bacterial invasion and limits of 2 to 4 hours were established as those within which primary repair was safe. Part of the problem of primary repair was the fact that the search for retracted stumps entailed opening up new areas of uninvolved tissue with the consequent danger of spreading invasive bacteria into other tissues. These limits, then, became pretty well established for primary repair and only in exceptional circumstances were they overstepped. Recently, Flynn has contended that under good conditions and in competent hands the time limits may occasionally be overstepped.

It was soon realized, too, that the nature of the wound was also of importance in permitting primary repair. Crushing injuries, injuries associated with open fractures, injuries with great loss of covering tissues, and injuries with primary inoculation of virulent invasive bacteria (human tooth injuries, slaughter house injuries) were not to be subjected to primary tendon suture or closure, either, for that matter. Hence, this group of wounds was excluded from primary tendon suture.

The usually poor results of repair of flexor tendons in the digits led many surgeons gradually to give up primary repair in favor of secondary repair later by means of tendon grafts. This zone of flexor tendon injury, picturesquely called by Bunnell "no man's land," extends from the middle of the middle phalanx proximally to the end of the fibrous sheath in the palm. To this zone, Pulvertaft has added division of the flexor pollicis longus within the thenar eminence (although for a somewhat different reason). Failure of successful repair in no man's land is due essentially to the fact that the healing tendon becomes adherent to the fibrous sheath and is functionless. However, a few surgeons—Koch, Allen, and Mason in Chicago, Verdan of Lausanne (Switzerland), and a few others—still maintain that under proper conditions and with certain steps in technique primary suture is feasible.

The problem of tendon repair in the hand is also intimately bound up with the physiologic and healing processes of tendons. Many studies of these processes have appeared in the past 50 years. Adequate discussion of this phase of the problem would fill volumes. Much attention was paid to the manner in which tendon healed, what cells took part in the process, and what factors influenced it. The poorer healing power of tendons in synovial sheaths led to many studies of the possible effect of the synovial fluid upon the healing process. One can refer here to the work of Marchand, Borst, E. Rehn, A. Biesin, Max Lange, Biesalski and Mayer, Garlock, F. Lange, Salomon, Mason and Shearon, Mason and Allen, and many others who have contributed to this as yet unsolved problem. Iselin, in his recent book, *Surgery of the Hand*, has admirably summed up the *status praesens* of the problem of tendon healing.

There is no difficulty in getting tendons to heal; if ends are held long enough in apposition they will heal firmly. The difficulty is in securing motion afterward. It has been fairly conclusively shown that tendons unite firmly in a period of 2.5 to 3 weeks. Firm union requires that they be held quiet during this period (although here Pulvertaft and Iselin tend to disagree). During this 3 week period, the healing tendon ends secure their nourishment and much of the uniting tissue from the surrounding tissues. This in itself makes for adhesions. Curiously enough, in most experiments and frequently in clinical observation, motion during this critical time seems to lead to increase in size of the callus and an increased tendency toward adhesions, and in the early stages, at least, to separation at the site of suture. Rest, on the contrary, permits firm union and less exuberant callus at the site of repair.

The literature on tendon repair is replete with studies of tendon repair and methods of tendon suture. It is well recognized that tendon ends cannot be brought together and held securely by ordinary methods of tissue repair. Tendon has tremendous tensile strength; however, its longitudinal fibers are held together very insecurely so that sutures pull through quite easily. Hence, every surgeon who has worked with tendon repair seriously has developed a suture of his own. All sutures are based essentially on the same principle, i.e., the introduction of suture material in such a way that it pulls transversely to the tendon fibers. It was also long recognized that tendon ends are in constant motion, minute it is true, but still enough to lead to a pull on any suture line, and, hence, sutures were devised to attempt to relax this pull. Nicalodoni advised the introduction of needles or sutures through the

skin which held the tendons at rest during healing. This procedure went through various modifications and in occasional instances is used today (Verdan in the fingers). However, it was not generally applicable and was modified by Lienhartz and Salomon to the attachment of a wire proximal to the line of repair, this wire being brought out through the skin and attached to a splint in such a way as to exert tension on the proximal stump. Bunnell has further simplified this technique by bringing the wire distally through the tendon stumps, out through the skin, and fastening it over a button or other object. By an ingenious technique the wire is later removed by a second wire (pull-out wire). This method has been quite widely accepted by many surgeons.

Other methods of relaxing the suture line, e.g., lengthening the muscle by myotomy or novocain injection, have not met with great favor. No method, however, does away with the need for splinting.

Most surgeons today, with few exceptions (Pulvertaft, Iselin to some extent, Couch of Toronto, and a few others), immobilize the hand following tendon repair for a period of 3 weeks, and then allow cautious guarded use for another week or so before permitting complete freedom of action.

NERVE REPAIR

The general principles of nerve repair of the hand have, likewise, been well established in the past 50 years. The volume by Pollock and the series of articles by Pollock and Davis have presented well the main outlines of peripheral nerve repair. The progress and general developments in the past half century have been reported in the review of neurosurgery, and the present status of peripheral nerve repair will be found in the volume from the Research Council of Great Britain, edited by Seddon.

The surgeon interested in the care, early and late, of injuries to the hand has had to keep abreast of progress in the management of peripheral nerve injuries as they apply to the hand. The attempt to split surgery of the hand into component specialties failed, since it was soon obvious that the care of an injured hand must devolve upon a single surgeon. It is not possible to assign one job to the neurosurgeon, one to the orthopedic surgeon, and still another to the plastic surgeon. All care, including nerve repair, must rest in the hands of one man, and he must master the various techniques of these different specialties.

As applied to the hand, the most significant advance has been the insistence on the early diagnosis of nerve lesions, more careful analysis of nerve action, and the recognition of the indication for primary and secondary repair. It has taken many years for the surgical profession to realize that the digital nerves are not so small but that primary repair of these nerves is not only possible but indicated, and that after repair they regenerate most gratifyingly.

As for diagnosis, there is seldom much doubt in the acute lesion; however, in the patient seen late in whom there is a history of nerve repair, it is sometimes difficult to be certain if nerve regeneration is taking place. In such instances, the electromyograph may be of great help in diagnosis as well as in plotting the course of regeneration.

There is some discussion today as to the advisability of carrying out primary nerve repair in the acute injury. This question arose out of experiences of World War II—wounded soldiers returning to the States and to England with what were purported to have been primary nerve repairs were found to have had most unsatisfactory results and required reoperation. It was felt, particularly by Seddon, that the fault lay in the disruptive nature of the injury which had made primary suture difficult or impossible, and that regeneration would have been much better if no attempt had been made at first instance, other than just tacking the nerve ends together to prevent retraction. It is true that because of the fibrosis of the perineurium secondary suturing of the nerves can be considerably easier than primary. At acute injury, the nerve ends are soft, often torn and disrupted, and good end-to-end apposition is difficult. At secondary repair, fibrosis has occurred, the ends are firm, more easily handled, and, if no great separation has taken place, a satisfactory repair can be carried out. It is scarcely indicated here to enter into the controversy which is still not settled. In general, the surgeon dealing with wounds of the hand prefers, when possible, to carry out primary suture, reserving for secondary repairs those cases in which contamination or age of the wound contraindicates suture. In case of secondary repair, there must be no unnecessary delay in carrying it out. The longer the interval

between the injury and repair, the more the shrinkage in the tubes of Schwann and the more difficult it is for penetration.

POSITION OF FUNCTION

Probably one of the most significant single advances in the surgery of the hand was the establishment of the position of function by Kanavel. This was truly a stroke of genius. Whether it gradually evolved as the result of observation of many cases, especially of hand infections, whether it came as the result of logical thinking of the dynamics of the hand, or whether it simply sprang suddenly to mind, we shall never know. If, however, all else concerning positioning of the hand be forgotten and only the position of function remembered, logical treatment of hand conditions would gradually evolve from it. It is fundamental, probably because grasp is the most basic of all functions of the hand. It is the ability to grasp with thumb on one side of an object, fingers facing it on the other, which has started off the human hand, and with it man on his course of world domination. At first this position was used especially when the hand was put at rest during acute infections, probably because of the difficulty encountered in restoring function after a bout of infection in which the hand was allowed to assume vicious positions of extension and flattening. Later, as the acute injury demanded the attention of the surgeon, it became evident that this position was very helpful in the care of this condition. It took many years to dissuade the profession from using the banjo splint in the care of fractured digits. It took longer to persuade the surgeon that every severe hand injury was better immobilized in the grasping position. Today, except for certain very definite indications, the hand is put at rest in the position of function in the treatment of wounds, burns, and infections, and whenever feasible postoperatively.

DUPUYTREN'S CONTRACTURE

Dupuytren's contracture has curiously enough undergone few fundamental changes in concept since the condition was described by the Baron nearly a century and a quarter ago. One is not surprised that Dupuytren was satisfied to carry out simple division of the constricted bands, since in his day any more extensive attack on the process would surely have been followed by disastrous infection. By 1905, however, the large surgical clinics in Europe and the leading surgeons in this country were advocating fascial excision, and today this remains the most accepted treatment. Variations occur in the technique of the operation, in the direction of the incision, in the amount of skin excised, and in the time of surgical attack, but, except for an occasional temporary revival of subcutaneous division, wide excision remains the treatment of choice.

From time to time, new drugs are advocated, tried, and discarded. Several years ago there was a great vogue for the use of vitamin E in the treatment of the disease. Today adrenocortical hormones and their derivatives are being tried, but no great success seems to attend their use. Irradiation therapy has been advocated and still has its proponents; however, the dangers of irradiating hand skin are so great that most surgeons shy away from it. Even the advocates of the treatment insist upon careful selection of the cases and the reported results are not entirely convincing.

One or two advances in operative technique seem worth while recording. The transverse incision along the distal palmar crease has pretty well supplanted all other incisions for complete fascial removal, except for Iselin who has adopted a long multiple-Z incision extending from finger into the palm. McIndoe has added to the transverse incision in the palm a small Z-plasty at the base of the digit. Tanzer has demonstrated the great value of tied-in compression dressings which are of very great value in helping to control oozing beneath the palmar flap. The older idea of splinting the hand out in complete extension following operation has been pretty well given up in favor of splinting in the position of function. This not only leaves the hand more readily restored to function but lessens tension on palmar suture lines with its danger of producing necrosis. Likewise, when the hand is splinted in the position of function, the need for skin grafting is very much less.

As to the etiology and pathology of Dupuytren's contracture, we are not much further along than we were 50 years ago. We know pretty well that trauma is not a factor, although this is not admitted by all (Skoog). We find some evidence of a hereditary factor in some 25 to 30 per cent of cases. The great galaxy of conditions suggested from time to time as having causal association are dismissed by practically all who have given serious study to the condition.

INCISIONS

The principles of incisions of the hand have become fairly well established during the period under consideration. The earliest serious consideration of types of incisions came in the drainage of infectious processes. Here initial consideration had largely to do with access to the collections of pus and the avoidance of important deep structures. It was soon realized, however, that adequate access and deep protection were not enough. Poorly placed incisions on healing left contractile scars or thick keloids with often quite disabling results. The most serious example of a poorly placed incision was that at the midline of a finger for drainage of a tenosynovitis. This almost invariably left a scar which, on contraction, pulled the digit down into acute flexion with hamstring dislocation of the tendons. Correction of the situation was next to impossible. This incision was early condemned to extinction by Kanavel who advised the so-called midlateral incision which skirts the ends of the transverse flexion creases on the digits. The longitudinal incision at the wrist was found to cause the same sort of contractile scar and was soon replaced by a bayonet-shaped incision from the palm, crossing the wrist transversely and then continuing upward along the lateral or medial side of the forearm. Pretty soon the hand surgeon learned another lesson from the plastic surgeon; namely, that to minimize scarring, incisions must follow or parallel skin creases (Langer's lines) and not cross them. This, of course, is not always possible, but when a crease must be crossed the incision should be curved quickly to reach the nearest skin fold. A good review of the incisions on the hand for various conditions is to be found in Bruner.

Wounds, of course, do not follow the so-called physiologic lines of incisions, and when it became necessary to enlarge them in case of acute injuries, the surgeon was often tempted to add a second incision crossing the wound at right angles. Healing from such ill-advised enlarging incisions was often quite disturbed and left contractile scars very difficult to deal with when secondary repairs were needed, as they often were. Every surgeon who has tried to carry out, say, a tendon graft on a finger with a cruciate midline scar knows the difficulty this causes. Hence, the general principles of enlarging incisions became established: namely, that the wound be enlarged in such a way as to make it conform to the physiologic elective incisions. The enlarging incision starts from one end of the wound and curves around in such fashion as to convert it into an incision which conforms as nearly as possible to physiologic lines. The surgeon may even ignore the original wound and make physiologic incisions proximal and/or distal to it, to find nerve and tendon ends not recoverable through the wound. This is true especially in case of wounds on the digits and in the palm. The surgeon, in undertaking secondary repairs on the hand or lower forearm, may frequently ignore the wound scar and place his incisions along physiologic lines.

In this connection, it is well to re-emphasize the debt owed to plastic surgery, orthopedics, and neurosurgery. It has probably been the adoption of the techniques and philosophy of the plastic surgeon which has had the most influence on surgery of the hand. Or, perhaps one should say that the adoption of the meticulous technique of the plastic surgeon has made it possible for the surgeon to carry out operations on the hand which would otherwise be doomed to failure. And much of this goes back to the teachings of Halsted, that delicate living tissues must be handled gently if we hope to secure primary and reactionless healing. The plastic surgeon's respect for tissue, his control of bleeding, his use of fine instruments and fine nonirritant, nonabsorbable suture material have been adopted by the surgeon doing work on the hand. Without this, he would be unable to carry out the difficult or even the simpler operations he performs so confidently today.

COMPRESSION DRESSINGS

From the plastic surgeon (Blair), also, the surgeon has learned the great value of resilient compression dressings, and these have been taken over into all of the field of surgery, particularly the management of burns and wounds, and postoperative dressings for reconstructive procedures. So important is firm, even, resilient compression and the position of function that one can scarcely see how hand surgery could be carried on without them.

BONES AND JOINTS

From the orthopedic surgeon comes a knowledge and understanding of the structure of bones and joints, and an appreciation of the mechanics of tendon action and function. Here we must,

of course, acknowledge the debt to Steindler, whose careful analyses of motion and functional position form the basis upon which one builds his consideration of functional restoration of the hand.

Steindler's pioneer work in this direction, not particularly or exclusively concerned with the hand, has influenced all of orthopedic surgery and has indicated a method of approach which has been very valuable, especially in problems of reconstruction.

A considerable amount of study has been devoted to the mobilization of the joints of the hand. Much depends, of course, on the cause of the stiffness and the position in which the hand was immobilized while the stiffness was developing. Here the insistence upon immobilization of the hand in the position of function is of great importance. If the stiffness is not too severe and if there is no bony ankylosis, the use of various types of constant traction apparatus, such as advocated by Kanavel, Bunnell, Koch, and others, has proved most helpful. Attempts at operative mobilization of the joints have not proved too successful except for the Shaw operation advocated in 1920. This is actually a capsulotomy of the metacarpophalangeal joints in which the tight collateral ligaments and adjacent areas of the joint capsule are excised. This simple procedure has withstood the test of time and is usually successful. Similar operations on the interphalangeal joints are not so successful. More extensive procedures, such as resection of one of the joint surfaces, interposition of fat or fascia, or the use of steel or plastic joints, have not proved as successful as had been hoped. Most surgeons prefer fusion in the position of function when simple methods of mobilization fail.

ANATOMY

The study of the anatomy and functions of the hand has intrigued man for centuries. As Kaplan has brought out so well in the introduction to his recent volume, *Functional and Surgical Anatomy of the Hand*, Galen devoted a great amount of space to the hand. It would appear that much of the basic knowledge of the hand was known long before the beginning of the twentieth century. Sir Charles Bell, in the *Fourth Bridgewater Treatise* published in 1834, deals entirely with the hand as evincing design. Some anatomic data are given, but the volume is mainly a lengthy but entertaining argument for purpose in nature. *The Boylston Essay* for 1897 by J. F. Walsh is devoted to the "anatomy and function of the hand." Wood-Jones in 1920 published a text entitled *The Principles of Anatomy as Seen in the Hand*. Duchenne's volume, *The Physiology of Motion*, originally published in 1867 and now available in English translation by Kaplan, is probably unsurpassed in observations on the physiology and function of the hand.

However, the knowledge was not put to use until the surgeon was capable, anxious, and ready to use it. The great upsurge in reconstructive surgery of the hand, particularly since World War II, has either sent the young surgeon back to the old volumes for study or to the laboratory to work out his problem, too often in ignorance of what has gone before. A not inconsiderable amount of study has been made of the mechanism of action of the intrinsic musculature, particularly with regard to the extensor apparatus and the intricate activities of the thumb.

The days are past when the surgeon carrying out operations upon the hand must have his *Spalteholz* opened on a chair in front of him while he attempts to identify nerves and tendons. The men carrying on hand surgery today know the anatomy of the part and have made special studies of it.

FUNCTIONAL RESTORATION

Much study is, likewise, going into analyses of the functions of the hand since it is realized that functional restoration and anatomic restoration are not necessarily synonymous. The knowledge of the use to which any hand in general or a hand in particular may be put is of great importance to the surgeon attempting reconstruction. He must do the job with what he has, to restore or make possible the maximum of function. This is often misunderstood and the functional end result of some very difficult and often brilliant surgery may be looked upon as hardly significant. It is in the badly mutilated hand or in the hand crippled by poliomyelitis or von Volkmann's contracture that the surgeon must know what basic function or functions he can restore to give the patient a useful hand. Often this is only enough of a grasp to manipulate the wheel of a chair, hold a match box, or steady a fork while cutting meat. It may be even less, a thumb which can be pressed against dress goods on a table. To restore even a minimum of use

to a poor, mutilated hand may mean little to the uninitiated, and when this is compared to a normal hand the result of blood, sweat, and tears may seem scarcely worth the pains. However, to the patient every modicum of motion, every area of sensation is a blessing beyond price.

While, therefore, the surgeon who attempts to restore a hand to function must understand the normal function and anatomy and, when possible, strive to return the hand to its initial state, his knowledge and understanding must go beyond this. He must realize that the finest actions of the hand depend upon a directing brain and that the anatomy of the hand only makes it possible for the brain to translate its thoughts into action. These actions and uses of the hand are dependent upon three basic functions—grasp, pinch, and sensation. Given these three functions, even if the tool is crude, many acts can be carried out. The reconstructive surgeon must, therefore, look upon the hand from the standpoint of function—not anatomy. Obviously, when the anatomy of the part can be restored this will likewise restore function; when, however, great loss of parts and tissues obtains, the guiding star is function. It is the development of this concept which promises most in reconstructive surgery of the hand.

RECONSTRUCTIVE SURGERY

When one attempts to trace the development of reconstructive surgery of the hand, it becomes obvious that much of the advance has been due to the development of technical skills, the success of which has depended upon observance of Halsted's "tissue-respect" technique, coined into the phrase "atraumatic technique" by Sterling Bunnell. We have discussed primary care of open wounds and have pointed out that there has been a gradual appreciation of the great importance of this phase of hand surgery. Skilled primary repair may obviate entirely the need for secondary surgery, even in some instances with extensive tissue loss, as so strongly emphasized by Brown's "one single operation" in injuries to the face.

There are, however, many instances in which reconstructive surgery becomes necessary, and it is here that the surgeon must not only know the techniques of plastic, neurologic, and orthopedic surgery but have an appreciation of the basic functions of the hand.

Defects involving the skin come first into consideration in reconstructive surgery. Scars of the skin may cause serious contractures which, of themselves, limit function. If deep repairs are needed, e.g., nerve and tendon repairs, and bone grafts, it is essential that the surgeon have satisfactory skin covering under which to carry out reconstructive procedures. Much of the scarring may be minimized at the operation for the primary injury by the judicious placement of incisions and by the use of split grafts, sliding flaps, or pedunculated flaps. At times, at primary operation the raw surface may be covered with a split graft which is later replaced by more suitable skin when conditions permit.

The correction of cutaneous scars may frequently be accomplished by free grafts, especially if there is no necessity for reconstructive work beneath. In the use of free grafts, the thin so-called "Thiersch grafts" and the small deep grafts of Davis have been almost entirely forgotten in favor of the thick split graft which frequently makes satisfactory definitive coverage even for the palm. In young children, however, the split graft may not keep up with growth and it usually seems wise to use the free full-thickness skin graft.

The free full-thickness skin graft, which is probably the most beautiful of all free grafts, is used probably somewhat less frequently today than it was 20 years ago; however, it frequently is indicated in the treatment of contractures (burns) and in the correction of congenital defects (syndactylism) in youngsters. This graft will often replace the pedicled flap on the hand in instances in which there is no need for deep repair but in which the surgeon desires a skin surface which will withstand hard usage, e.g., on the palm. The free full-thickness graft is very valuable in the correction of burn scars in adults, and is also most satisfactory in suitable cases of irradiation injuries to the hand if there is no actual ulceration.

In the cases of scars which must be excised as a preliminary stage to deep repair, it is necessary to replace the scarred skin with normal skin and a layer of subcutaneous fat. Pedunculated flaps are here the most often used. The surgeon is becoming more adept at the application of these flaps, thanks again to lessons learned from the plastic surgeon. Nowadays we do not so often see the thick, biscuit-shaped, unsightly flap with a contractile circumferential scar, often only a token and useless. Instead, the surgeon is learning to apply much thinner flaps, particularly by the

delay technique, so that they are serviceable and the cosmetic appearance is satisfactory.

A procedure which is becoming more and more generally used on the hand in instances in which a flap is required is the use of the shift or rotation flap. This consists in the use of pedicled flaps of hand skin shifted or rotated from one area of the hand to another. The bed of the flap is covered with a split graft. It is not always possible to fashion such flaps on the hand; however, their advantages are evident. Cross-finger flaps are likewise finding increasing usefulness. They have been found very valuable in covering defects on the volar surface of the digits when there is exposure of tendons or joints, and for covering finger tips. In some cases, the denuded finger may be covered with a tiny flap of skin raised from the palm, although some surgeons feel that besides the addition of palmar scar there may follow a flexion contracture of the finger which may be difficult to control.

Pocket flaps from the abdomen or thigh may be raised and applied immediately; they have the advantage of numerous pedicles and, therefore, the certainty of a good blood supply. They have been found most valuable in the acute injury involving the dorsum of the hand with extensive exposure of tendons and bones. Degloving injuries, if seen immediately, may often be placed in a pocket with resultant preservation of a useful hand. Extensive burn scarring of the dorsum may also be a good subject for this procedure.

BURNS

Probably one of the most difficult problems for the hand surgeon is the treatment of burns. In the initial treatment, emphasis is placed on proper cleansing followed by immobilization of the hand in the position of function in a compression dressing. It is extremely important in these cases to prevent, as far as possible, the development of infection which may change a partial-thickness loss into a full-thickness loss and lead to extensive deep fibrosis. Here, therefore, every effort is made to secure early healing and, to this end, it is often possible to excise destroyed skin as early as the fifth to the seventh day and replace it with split grafts. While it is realized that this skin may eventually require excision and replacement with free full-thickness skin (especially true in children), early healing minimizes deep scarring and attendant contractures.

Burns of the hands received much attention during World War II because of their great frequency, especially among aviators. Tannic acid treatment, already on the way out, was discarded almost at once at the beginning of the war. Many methods of care were tried in attempts to secure early healing and to preserve motion; however, as Rank and Wakefield have pointed out, the best way to preserve motion is to secure early healing. Early cleansing and immobilization in the position of function under compression would secure early healing of deep second-degree burns. However, the full-thickness burn required, in addition, the removal of slough and early grafting. In order to preserve motion, many surgeons kept the hand mobile during early care, even to the extent of placing the hands in water-tight bags where they were bathed in mild antiseptic solution and the patient was required to keep up motion. These two opposed views of the means to preserve function—early healing versus early motion—were considerably debated during the early stages of the War. The final solution was a return to first principles.

When the burn has been deep with the dreaded exposure of extensor tendons and of joints (especially proximal interphalangeal joints), we have a problem which has not as yet been solved satisfactorily. In the early stage, grafting with split grafts right up to the exposed bone and joints leads to early healing. Later excision of the skin and replacement with a flap with the digits ankylosed in partial flexion at the proximal interphalangeal joints gives a functioning hand with motion at the metacarpophalangeal joints.

IRRADIATION INJURIES

Irradiation injuries to the hand present a problem not present in the heat burn. The danger of irradiation damage to the hands has been recognized for 50 years (Porter) and, although the professional radiologist has learned to avoid it, his professional brothers have been much more reluctant to take safety precautions. Greater accuracy in dosage and more careful consideration of indications for irradiation therapy of hand lesions have tended to reduce some of the hazards. Unfortunately, however, such lesions are still being seen and often present difficult problems. The causes and factors of the irradiation burns, as seen today, have been extensively discussed by Brown *et al.*, McIndoe, Greeley, Teloh *et al.*, Mason, and others. While prophylaxis de-

serves first place, as these burns should not occur, treatment for the established lesion is the problem which confronts the surgeon. It is now well realized that there is only one adequate treatment and that is early excision and replacement of the involved skin with grafts. In the early days, lesions were treated conservatively with salves and ointments, keratotic spots were electrodesiccated, and, in some instances (most unwisely), the "sick" skin was further pelted with irradiation in the form of radium or radon. It is now realized that the cells of the skin are damaged permanently and that no amount of salves or ointments will lead to cure. The condition once established is progressive and manifestations develop gradually and inexorably. Nothing is to be gained by waiting for ulcers and piled-up keratoses to develop before carrying out complete excision and replacement. Development of malignancy in this skin is well recognized and can be prevented only by wide excision. It is likewise recognized that in the early stages the carcinoma (rarely sarcoma) is locally confined and wide excision will produce cure. This is, of course, another cogent reason for early treatment, since the carcinoma can become invasive and metastasize once the fibrotic barrier has been broken down.

SECONDARY TENDON REPAIR

Secondary repair of tendon injuries may be carried out by suture if the lesions are not too old and if the location of the lesion is proper. Probably the greatest advance in secondary tendon repairs has occurred by the use of tendon grafts to replace flexor tendons in the digit. A very definite plan of procedure has been evolved concerning these injuries. Earlier in this article the controversy concerning primary repair in "no man's land" was discussed, and it was brought out that primary tendon suture in the digits, even by those who advocate it (Allen, Verdan), depends on very strict indications, so that in the majority of lesions secondary repair is indicated. The technique of this repair, while varying in details with different surgeons, is basically the same. The profundus tendon only is replaced and the sublimis is removed from the sheath. The tendon graft extends from the attachment to the distal phalanx into the palm where it is attached to the proximal profundus stump near or at the region of origin of the lumbrical muscle. Every effort is made to preserve the tunnel in the finger through which the tendon runs and which holds it against the digit and prevents bonestring deformity. If these vaginal ligaments have been destroyed, they are replaced by grafts of tendon encircling the bone—one over the middle of the middle phalanx and another over the middle third of the proximal phalanx. Great care is taken not to traumatize the graft, most surgeons removing the tendon graft with its surrounding paratenon so that, as Koch has pointed out, at least one surface of the tendon tunnel is untraumatized, smooth, and glistening. As the source of the graft, the surgeon may use the palmaris longus, if present, and if only one tendon is required. Otherwise, the long extensors of the toes may be used. The main differences in technique concern the attachment of the tendon to the distal phalanx. It must be attached well distal to the joint so as to have a good mechanical advantage. Few surgeons now draw the tendons through the bone or attempt to encircle the bone with tendon. Experimental studies by Hauser have shown that all that is necessary is to hold the tendon against the raw bone, to which it becomes securely attached in 14 to 21 days. Some surgeons draw the graft up under the distal stump and tack it there with a few silk sutures. Others (Littler, Allen) shave the distal profundus insertion into a "V" shape and insert this in a "V" cut in the end of the graft. Many surgeons today, both here and abroad, are following Bunnell in drawing the tendon against the bone by means of a "pull-out wire" which comes out through the finger tip and nail where it is held over a button or lead shot, to be withdrawn at the end of about 3 weeks. Most surgeons immobilize the hand for some 3 weeks after operation to permit firm healing.

This does not represent, by any means, the extent to which tendon grafts are used on the hand, nor does a brief recounting indicate adequately the many trials which beset the surgeons undertaking tendon grafting of the hand. The pioneer work of Biesalski and Mayer on the physiology of tendon transplantation gave some of the earliest clues to successful tendon surgery in emphasizing the need for preserving adequate channels where tendons may glide, especially when change of direction occurs. The early clinical use of tendon grafts by Kanavel, Bunnell, Marble, Browne of Boston, and others has seen fruition in the confident use of tendon grafts by the younger men doing hand surgery today.

The fingers are not the only situation where tendon grafts are needed or useful. They may be used wherever it is necessary to restore continuity when end-to-end apposition cannot be secured. Thus, in many secondary repairs the surgeon will find it necessary to utilize grafts.

Other structures and materials than autogenous tendon have, likewise, been used to bridge gaps in tendons. The use of silk and linen, while occasionally successful, has been given up. Success by this method depended upon the ingrowth of fibrous tissue into the suture strands and transformation into a scar tissue strand. Nageotte and surgeons working with him experimented with the use of fixed tendon grafts. According to this author, if tendon can be properly fixed so as to destroy the cells but not disturb the collagen, the resultant tendon (homologous or heterologous) may be used successfully as the graft. The collagen framework maintains its characteristics and is revivified by cellular ingrowth. The work has not received general acceptance. There are a few reports of the use of refrigerated homologous grafts, but nothing has been developed comparable to a bone bank. The whole crux of the problem lies in the need to secure motion as well as fixation. Any material living or dead, autogenous, homologous, or heterologous sets up a reaction, and attachment to a greater or lesser degree takes place.

So confident have surgeons become in the use of tendon grafts that a few have utilized grafts for the primary repair of divided flexor tendons in the digits. This is definitely a procedure only for those very favorable cases seen early and under good conditions and for the surgeon highly skilled in the technique.

TENDON RUPTURE

In the repair of the extensor tendons, sutures are successful and grafts may be used with assurance over the dorsum of the hand and forearm where, because of the paratenon tissue, healing is good. Three special lesions of the extensor tendons have called forth a considerable amount of study and two of them are still far from being satisfactorily solved. Rupture of the extensor pollicis longus, known for a long time as "drummer's palsy" due to its occurrence in the German Army drummers, is seen from time to time following Colles fracture. Three methods of repair have been suggested. Since the tendon is usually frayed and degenerated at the site of rupture, suture is out of the question. A tendon graft may be used; however, the location of the proximal stump of the extensor pollicis longus requires a not inconsiderable dissection. Most surgeons prefer to carry out a tendon transference, using either the extensor carpi radialis brevis or the extensor indicis proprius. Transference can be carried out through a minimal incision and the functional results are usually very good.

The story concerning the other two extensor tendon lesions is not so satisfactory. The first lesion is rupture of the extensor tendon in the distal phalanx or "baseball finger." This has been treated by a great variety of techniques and it seems to be generally agreed that no final solution has yet been reached. In the acute stage, most surgeons prefer to splint the joint in extension for 5 or 6 weeks. It seems logical to splint the digit in flexion at the proximal interphalangeal joint and hyperextension at the distal interphalangeal joint. However, not all surgeons agree with this, possibly because this splinting is very difficult to attain. Pratt immobilizes in extension by means of fine Kirschner wires which pass through the distal interphalangeal joint and upward across the proximal interphalangeal joint which is held in flexion. Immobilization alone, if the case is seen early, either by splint or a Kirschner wire, will yield successful or satisfactory results in a fair percentage of cases. The not infrequent failure of splinting has led some surgeons to advise immediate operative repair. There seems to be some justification for this position when one considers that the tear always ruptures the joint capsule, since the tendon and capsule are practically continuous and frayed bits of the capsular tissue are sure to fall into the joint space. It seems possible that somewhat better results may be achieved by immediate operative repair.

When the case is seen late, operative repair must be considered. The tendon is so tissue-paper thin at the site of rupture that suture is very difficult. Bunnell has been successful in repairing the lesion with a pull-out wire and appropriate long-time splinting. Others have used tendon grafts. Iselin uses a tendon graft passed beneath the proximal stump where it is adherent to the middle phalanx and bringing the two ends of the graft distally to either side of the distal phalanx where they are held by two pull-out wires. He considers this to be the best procedure yet devised, and it has given him very good results.

The other lesion, of which treatment is not entirely solved, is that of rupture or division of the central slip of the extensor aponeurosis at or proximal to its insertion into the middle phalanx (so-called "button-hole" dislocation). The peculiar deformity of the digit (flexion of the proximal interphalangeal joint and hyperextension of the distal interphalangeal joint) is easily explained when one considers the anatomic arrangement of the extensor expansion. Many anatomic studies have been made of the disposition of the extensor expansion, consisting of the extensor, lumbrical, and interosseus tendons. If seen early, the lesion may be corrected by splinting of the digit in extension. Later on, however, simple splinting will seldom take care of the problem. The essential primary lesion is upward retraction of the central slip. Secondary to this, the lateral slips are pulled upward, dislocated volar-ward, and tend to become stuck there as soon as they cross the joint condyles. Repair then will require open operation, usually by tendon grafting. Two factors must be taken into consideration: first, the repair of the central slip and, second, the correction of the volar dislocation. In some instances, it will often be enough to release the lateral slips and bring them dorsally by means of sutures, or, as Koch has done, with a fine tendon graft. Nichols inserts a graft to repair the central slip. Fowler passes a graft beneath the extensor tendon and crosses the ends which are then attached to the lateral slips proximal to the joint. Successful results have been reported by all these techniques, but no one method yet seems standard.

SECONDARY NERVE REPAIR

Secondary repair for nerve lesions has become pretty well standardized to suture followed by adequate immobilization. In a limited number of cases, nerve grafts have proved successful. When repair of nerves cannot be carried out, various procedures have been utilized to substitute for the paralyzed muscles.

Secondary nerve suture depends upon the ability to mobilize satisfactorily the proximal and distal stumps in such a way that accurate end-to-end suture can be carried out without tension. Various maneuvers are applicable. Transference of the ulnar nerve anterior to the medial epicondyle is a well established technique. Some length may be gained in the median nerve by bringing it anterior to the pronator teres. The radial nerve may, likewise, be rerouted anterior to the humerus. When these procedures fail, the surgeon may often carry out bulb suture, i.e., simply suture the proximal neuroma to the distal glioma and put up the forearm and hand in such a position as to obtain maximum relaxation. After 3 or 4 weeks, the part may be gradually straightened and with it the nerves are lengthened. Six to 8 weeks later, on re-opening, it may be found possible to carry out suture. Occasionally, this maneuver must be carried out a second time.

When such procedures are not feasible, the possibility of using nerve grafts arises. It is difficult to assess the value of nerve grafts. In the hands of some surgeons, Bunnell particularly, these grafts have served their purpose very well. Seddon has, likewise, reported successful cases. Experimentally, Davis and Perez have shown that these grafts, even homologous ones, survive and that axones grow down through them. Certainly, small grafts, e.g., for digital nerves, are highly successful. For larger nerves, the graft should be made up of a number of small nerves rather than one large nerve. Seddon reported that about two-thirds of the nerve grafts were helpful. Nevertheless, the results of grafts are not so brilliant, but every effort should be made to secure suture, failing which, certainly, palliative procedures offer more certainty of help for motor return.

TENDON TRANSFERENCES

In the instances in which nerve repair is not feasible, considerable help may be secured and function restored by other maneuvers. These include, particularly, tendon transferences for radial, median, and ulnar paralysis. Transference for radial paralysis is the older, better known, and the most successful of all such procedures. Numerous transferences have been suggested and, in general, most of them work satisfactorily. Scuderi has recently reviewed this situation and has reported it in SURGERY, GYNECOLOGY AND OBSTETRICS. With variations, the operation consists of the transference of functioning flexor tendons (flexors of the wrist, palmaris longus, pronator teres) into the extensors of the digits. Occasionally, it seems wise to carry out a tenodesis or arthrodesis of the wrist, but this is not frequently done.

Tendon transference for median nerve paralysis (which results in the inability to rotate and oppose the thumb) has received considerable at-

tention in the past 15 years, and especially since World War II. Bunnell has established the essentials of the operative procedures and the anatomy and principles to be followed. Whatever technique is used, the pull on the thumb should be toward the pisiform bone. The transferred tendon should pass over the center of the metacarpophalangeal joint of the thumb to be inserted into the base of the proximal phalanx on the ulnar side. This is necessary so as to rotate the thumb and to avoid flexion deformity which is sure to occur if insertion is distal to the joint. The work of Brand in India and Riordan of New Orleans in treating hands of lepers has added a great deal to our knowledge of this procedure. Likewise, work on poliomyelitic patients by Irwin and others has established many important technical details of this procedure.

Attempts at tendon transference or other procedures for compensation of intrinsic paralysis following irreparable ulnar nerve lesions are reviewed by Homans. Efforts consist mainly in attempts to redirect the pull of the flexor sublimis tendons to the dorsal extensor expansion. Lexer used for this purpose fascial strips which were inserted proximally in the sublimis tendons, drawn about the sides of the digits, and inserted on the dorsum into the extensor expansion. A procedure was proposed and carried out by Witteck (1914) in which slips of the sublimis were directly transplanted without fascial intervention. Nussbaum (in Hohmann) also utilized the sublimis tendon by direct transplant. Bunnell has modified these procedures by transferring sublimis slips to the extensor expansion. The index finger loses power of abduction with ulnar paralysis, and Bruner has proposed transfer of the indicis proprius or extensor pollicis brevis to the interosseus expansion on the lateral side of the joint.

RESTORATION OF THE THUMB

Operations to restore the thumb to use or to reconstruct a missing thumb have assumed more and more attention in the literature in the past 10 years. There are a number of situations in which the function of the thumb is seriously curtailed and each one calls for a somewhat different solution.

The thumb may be held in a vicious scar to the side of the hand and all motions of grasping and opposition may be impossible. If this is not too severe, a Z-plasty and associated free full-thickness skin grafts may release the web and permit satisfactory motion of the thumb. It may be well, under some circumstances, to hold the first and second metacarpals apart with Kirschner wires to prevent recurrence of the contracture following operation. These wires may be removed in a few weeks.

If, in addition to scar, there is paralysis of the thenar muscles or if irreparable median paralysis is present and tendon transference is not possible for some reason, the placement of a bone block between the first and second metacarpals may be indicated. This will hold the thumb permanently in opposition.

Most attention to thumb disability has been given to cases in which there has been loss of the member and the surgeon wishes to restore it. Excellent discussions of the development of operations for replacement of the thumb are found in Hilgenfeldt's book, and in Iselin's recent edition of his *Surgery of the Hand*.

Iselin's account gives some historical background and discusses the various surgical approaches to the problem. This author points out that the philosophy of digital reconstruction was for a long time that of Nicoladoni of Austria. This surgeon fostered and carried out many operations for the restoration of digits with toe transfers, skin flaps, and bone grafts. This philosophy dominated all surgical thought until about the time of the second World War. Immediately following the War there were a number of articles on thumb replacement with tube flap and bone graft. These seem to have been the last fling of this type of thumb replacement. Soon afterward a number of surgeons reported thumb reconstruction based upon a different philosophy, namely, that of utilizing elements of the injured hand itself to reconstitute the thumb or, as Iselin points out, to fashion a pincer. In this connection, Hilgenfeldt, Le Toc and Chippant, Gosset, and Littler, whose procedures differ largely in the choice of digit to use, deserve attention.

Much depends, however, on the condition of the rest of the hand and the remnants of the thumb. No rigid rules can be laid down. If possible, remnants of the hand should be utilized to form the pincer. The procedures vary from simple deepening of the webbed space between the thumb remnants and side of the hand to reconstruction of the thumb if this member is missing. With four normal digits, it would seem unwise to sacrifice an entirely normal finger and

transfer it to the thumb position; however, such has proved highly successful in the hands of the surgeons just noted. If one of the remaining digits is mutilated, transfer of this one seems more justified than the use of a normal finger. The advice given by Hilgenfeldt has seemed sound to the writer, namely, to delay digital transfer until the patient has had adequate trial of use without it. Gosset advises transfer of the index finger, Hilgenfeldt of the middle finger, and Le Toc of the ring finger. Littler pictures transfer of the index finger.

Elongation of a shortened first metacarpal, as advised by Hughes and Moore, is a less ambitious procedure, but gives excellent functional results. At times, when the hand is reduced to metacarpals or to two widely separated digits, it is often possible to make a pincer by resection of one or two of the central metacarpals. Here, as in all surgery of the hand, the emphasis must be on function—not anatomy.

To one interested in this phase of reconstructive surgery of the hand, the writings of Guermonprez are of great interest. We are indebted to Iselin for calling our attention to the works of this man whose concept of reconstruction of badly injured hands dominates our approach today. This surgeon utilized remnants of badly mangled hands to fashion a functional pinching and grasping organ. Hampered, of course, by inadequate surgical facilities, this surgeon conceived of hand reconstruction on functional lines, and the treatment in many of his cases reported in the period from 1887 to 1895 is modern in its approach.

SPLINTING

Splinting of the hand may be applied to provide either mobilization or immobilization. The immobilizing splints have been devised either to hold the hand in the position of function or to hold the part in relaxation during the healing of nerves, bones, and tendons. Many types of such splints have been devised, the only requirement being maintenance of satisfactory position. Probably the greatest variety exists among splints for the maintenance of the position of function, i.e., dorsiflexion of the wrist with fingers and thumb in grasping position. The aim in such splints has been to permit motion of the parts of which immobility is not needed. Such splints, therefore, range from simple finger splints curved to hold the digit in moderate flexion at all joints, to those holding the wrist in dorsiflexion but permitting the fingers to move, and splints holding the entire hand at rest. The essential thing is to keep the part at rest in a favorable position during healing. Another group of splints have been devised to mobilize the hand. These are based on the concept that moderate but continuous elastic traction will slowly stretch out adhesions or lengthen tendon or muscle. These splints have been produced in a myriad of methods, with rubber, coiled tension springs, or steel bands to furnish the traction force. Splints of this type are valuable in correcting deformities of the hand due to fibrosis, e.g., following infections or following prolonged immobilization. It is often possible to correct vicious positions or to mobilize stiff joints previous to operations for tendon restitution. Thus, fingers held for a long time in flexion or extension, or which have stiffened following surgery may often be corrected by periods of extension or flexion traction splinting. A vicious position following button-hole dislocation of a finger (tear of central slip of extensor aponeurosis) may be corrected prior to operation by tension splinting on a simple splint, and occasionally this will lead to restoration of function without operation. Likewise, many cases of von Volkmann's contracture are helped by constant traction splinting, which in some instances may be sufficient to restore acceptable function.

Another valuable splinting procedure in lesions of the hand is the support of paralyzed muscles during recovery following nerve repair. Thus, in cases of radial paralysis the extensor muscles are supported by various types of splints which hold the wrist in extension and the thumb and metacarpophalangeal joints of the fingers in a position just short of complete extension. When motion is on the way to recovery, rigid support is replaced by elastic support which brings the fingers back into extension following flexion. For ulnar lesions it is necessary to prevent overstretching of the interossei and lumbricals. This may be accomplished by rather simple splints which fit over the dorsum of the hand and hold the metacarpophalangeal joints in slight flexion. In some instances in which adductor action of the thumb is entirely lost, it is wise to add a component to the splint which holds the thumb slightly adducted. For median paralysis the most important action lost is rotation and opposition of the thumb, this member tending to lie in a position alongside the palm. A

rather simple strap and wristlet will keep the thumb in a grasping position during recovery of the thenar muscles.

WORLD WAR II HAND CENTERS AND SOCIETIES FOR HAND SURGERY

At the beginning of the second World War the Surgeon General (Kirk) requested Sterling Bunnell to supervise the development of hand surgery in the Army. Bunnell expended a great amount of time and energy in this task and accomplished an excellent result. Various centers were established in Army hospitals throughout the country and to these patients with hand injuries were funneled after their return from overseas. In each installation, Bunnell undertook the tremendous task of training, by precept and example, young surgeons in the reconstructive procedures and technique of hand surgery. It was a huge job well done and gave a significant impetus to the development of hand surgery throughout the country. The young men whom he trained, along with certain others long interested in this field, formed the nucleus for the development of the American Society for Surgery of the Hand. Similar organizations in England and Sweden and a special division in the French Society of Plastic Surgeons attest to the *world-wide interest* in surgery of the hand.

Much yet remains to be told of surgery of the hand. The chronic infections, tumors, congenital deformities, the arthritides, and many other topics could well take up many pages. We have said nothing of von Volkmann's contracture, the treatment of which (thanks to the work of such men as Steindler, Goldner, d'Aubigné, and others) offers help to the unfortunate victims of this condition. Many puzzling conditions (posttraumatic edema and causalgia), while not entirely solved, are somewhat better understood than they were 50 years ago. A long chapter could be written on the estimation of disabilities of the hand from the standpoint of the compensation boards, and this subject could well be discussed in a philosophic essay on the rigid standards of disability. No doubt, as Kaplan has hinted in his introduction, much has happened in the fields of psychology and psychiatry which would be applicable to surgery of the hand.

I think, however, that we may conclude by noting that in the past 50 years surgery of the hand has become of age. From a somewhat neglected field, turned over to the most junior man on the service, it now demands the attention of some of our best surgeons. Clinics devoted to the care of conditions of the hand have developed in many leading hospitals, both here and abroad; societies of hand surgery have been formed, and sessions of our great national and international societies are given over to problems concerned with this field.

Probably the most urgent problem demanding solution is that of tendon healing, especially of the sheath–enclosed flexor tendons. Study of this problem must be made from the ground up and the whole process of healing re-evaluated. The problem resolves itself into concern regarding two apparently opposite desiderata, namely, firm healing which requires rest and immobilization, and smooth gliding which is thought by many to require early motion. When this problem has been solved, another great stride will be made in surgery of the hand.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Papillary Adenocystoma Lymphomatosum (Warthin's Tumor). CORNELIUS E. SEDGWICK and ROBERT E. SASS. *Am. J. Surg.*, 1955, 89: 955.

ALTHOUGH HILDEBRAND, in 1895, reported the first case of papillary cystadenoma lymphomatosum, it was Albrecht and Artz in 1910 who established this diagnosis as a distinct entity, and Warthin in 1929 who described the histopathology. There are many theories as to the origin of this tumor, but it must be assumed that the tumor is a developmental anomaly of unknown origin.

The usual clinical history is one of a painless mass at the angle of the jaw. Other areas in which this tumor has been found are the submaxillary area, lateral to the upper pole of the thyroid, the posterior auricular area, the anterior margin of the sternocleidomastoid muscle, and the bifurcation of the carotid artery.

The tumors have usually been present from several months to several years before being presented, the average duration being about 4.5 years. The mass is usually unilateral, discrete, and not attached to the skin or deeper structures. Clinically it is impossible to distinguish this tumor from a mixed tumor of the parotid gland.

The treatment of papillary adenocystoma lymphomatosum is surgical excision with preservation of the facial nerve. In the present report, there were 21 cases seen at the Lahey Clinic, Boston, during the past 8 years. This represents an incidence of 5 to 6 per cent of all parotid tumors occurring in both sexes. In this series there were 17 men and 4 women. The most common age occurrence is from the fifth to seventh decades of life. One recurrence was noted following excision at the Lahey Clinic, although 4 patients had recurrences following excision at other hospitals.

Gross examination demonstrated a round, encapsulated and usually lobulated tumor with pinkish gray or yellow trabeculated tissue. Histologically, the stroma was composed of reticulum containing lymphocytes and well developed lymph follicles. The epithelial cells were arranged in a cystic or papillary pattern. These cells were tall, columnar, and had a fine granular eosinophilic cytoplasm. The basophilic nuclei were located in the distal half of the cells, and cilia have occasionally been reported.

—Jerry A. Stirman, M.D.

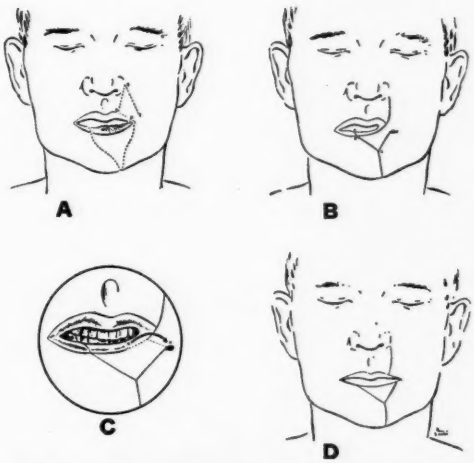


FIG. 1 (Ashley). Schematic drawings of the stages in reconstruction of the lower lip using a modified technique: (a) outlines of the two flaps and area to be excised including the cancer; (b) intermediate stage with flaps transferred to defect in lower lip; (c) method of severing flap and fashioning new commissure; (d) final postoperative result.

Reconstruction of the Lower Lip. FRANKLIN L. ASHLEY. *Plastic & Reconstr. Surg.*, 1955, 15: 313.

THE ANATOMY of the lip is reviewed and a brief history of the major reconstructive procedures of contemporary surgeons is outlined. Illustrative cases representing the treatment of some of the more common types of lower lip deformities are presented. These include:

1. The Stein-Estlander procedure for a medium-sized lesion, utilizing a flap from the upper lip rotated directly through 180 degrees, without utilizing the commissure.

2. The author's procedure recommended for lesions involving half or more of the lower lip in older people not in good general condition. This is based on rotating two flaps; one mucosal, and one full thickness except for the vermilion from the upper lip and nasolabial region, through only 90 degrees. Obstruc-

tion to the oral aperture is minimized by rotating the two flaps around the commissure (Fig. 1), and torsion on the blood vessels is minimized.

3. A modification of the Owens and Smith procedures for immediate soft tissue reconstruction of the entire lower lip using locally available tissues.

4. A method of transferring large amounts of soft tissue from a distance in that group of cases, in which, in addition to the lower lip, the adjacent tissues are also lost and reconstruction by means of the neighboring tissues is prevented. The procedure described here involves the transfer of a "marsupial" type of flap (method of Cuthbert) from the abdomen via the arm as a carrier. This was followed 9 months later by an iliac bone graft to replace the mandible from angle to angle, and tatooing of the graft to match the normal facial skin and simulate the vermilion border.

—*Carl Schiller, M.D.*

EYE

Late Effects of Beta Radiation on the Eye. GEORGE R. MERRIAM, JR. *Arch. Ophth.*, Chic., 1955, 53: 708.

THIS TIMELY ARTICLE expresses the results of several years' work by the author, and the seemingly innocuous immediate result of beta radiation can now be viewed in the serious light of late and far-reaching permanent effects, some of which do not appear for 10 to 15 years.

The author recommends the standardization of dosage and suggests that roentgen equivalent physical (rep) units be used.

Conjunctival lesions include telangiectasis which appears 5 years after treatment, and with only 2,000 to 5,000 rep. This is permanent. Keratinization was observed with 5,000–10,000 rep and is similar to vitamin A deficiency and keratitis sicca. Treatment is useless and the patient remains with punctate keratitis, blepharospasm, and photophobia.

Scleral lesions are produced by 10,000 to 20,000 rep and consist of scleral necrosis. Five such cases are noted.

Corneal effects are punctate keratitis and corneal vascularization with scarring, this being contrary to frequent reports on the efficacy of beta radium in eradicating corneal vessels.

Uveal complications include iritis produced with 22,000 to 27,000 rep and iris atrophy 3 to 13 years after treatment with 20,000 to 30,000 rep.

Radiation cataract, 3 to 13 years after treatment, was noted in 8 cases with 2,300 to 20,000 rep.

The author then presents case histories with photographs of the above lesions.—*Albert C. Frell, M.D.*

Gas Gangrene Panophthalmitis; Review of the Literature; Report of New Cases. ROBERT B. LEAVELLE. *Arch. Ophth.*, Chic., 1955, 53: 634.

ONLY 53 CASES, 7 from the United States, of gas gangrene panophthalmitis have been reported. The author adds 3 more and discusses the condition in some detail.

Several factors are noted in every case:

1. Infection followed a perforating wound of the globe.
2. No therapy preserved any vision.
3. Radical treatment was necessary.
4. The postoperative course was smooth.

Infection started with a penetrating injury while the patient was hammering or chipping metal or stone. In 12 hours, pain and visual loss with chemosis and brawny edema of the lids occurred. In 24 hours, proptosis, hypopyon, a coffee-colored discharge, gas bubbles in the anterior chamber, and systemic signs of toxemia occurred.

The laboratory diagnosis was not available for 48 hours, and x-rays showed the foreign body in the vitreous. All cases ended in enucleation, evisceration, or exenteration with no systemic spread of the disease.

Clostridium perfrigens (Bacillus welchii) was the organism most commonly indicted, but all four species of the clostridium group caused panophthalmitis. The organism was present on the foreign body, in the conjunctival sac, in the tear sac, or on the lashes.

Three case histories were presented in detail by the author. —*Albert C. Frell, M.D.*

Angle Closure Glaucoma; Subacute Types. PAUL A. CHANDLER and ROBERT R. TROTTER. *Arch. Ophth.*, Chic., 1955, 53: 305.

THE AUTHORS acknowledge wide angle and narrow angle types of primary glaucoma as being fundamentally different, but prefer the terms open angle and angle closure glaucomas. Both types elevate the ocular tension by obstructing the outflow of aqueous from the anterior chamber but differ in the mechanism of producing the obstruction. In open angle glaucoma, the obstruction is in the filtration apparatus itself, while in angle closure glaucoma the filtration apparatus is at first normal and the obstruction is due to closure of the angle by contact between the iris root and trabecular well. Later, after repeated episodes of angle closure, there may be damage to the corneoscleral meshwork.

Several diagrams and schematic drawings in the original article illustrate various stages of the aforedescribed types of primary glaucoma. Subacute angle closure glaucoma is defined by the authors as a form of glaucoma in which the increased ocular tension is due solely to closure of the angle, but in which the entire angle is not closed at one time; thus it differs from acute narrow angle (angle closure) glaucoma. In early cases, the eye returns to normal between attacks, although after repeated attacks, peripheral anterior synechiae form which close portions of the angle, or the trabecular meshwork may be damaged.

The literature on subacute angle closure glaucoma was reviewed, and little material was found dealing specifically with the subject; however, the "chronic congestive" glaucoma of the older literature probably refers to subacute angle closure glaucoma. Primary contributions were made by Barkan, Goldman, Grant, and Miller.

Characteristics of subacute angle closure glaucoma concerning the chamber angle and the clinical picture were considered. The chamber angle is anatomically narrow and, with various physiologic factors, such as relative pupillary block, dilatation of the pupil, and sudden dilatation of the uveal vessels, a portion of the angle closes and the tension rises to a varying degree. Either spontaneously or with miotics, the angle again

opens completely and tension returns to normal. With repeated episodes of angle closure, anterior synechias form or the trabecular meshwork is damaged. The result depends on the extent of these processes, the ocular tension may return to normal or remain somewhat elevated in spite of the use of miotics. As to the clinical picture, there is usually a history of periodic attacks characterized by normal ocular discomfort, blurred vision, and colored halos. Attacks are more common during the winter months and during the late afternoon, probably because of diminished light with a correspondingly dilated pupil. They are often precipitated by emotional upsets probably due to associated pupillary dilatation or congestion of the uveal vessels. The history may indicate that the attacks are precipitated by watching moving pictures, television, or driving at night. External examination usually reveals a quiet, white eye with a shallow anterior chamber. The cornea may be clear or show some edema of the epithelium. On slit-lamp examination the iris is seen to come closer to the cornea as the beam approaches the periphery of the cornea until it almost or does touch the cornea at the extreme periphery. The pupillary size and reaction depend on tension. Examination of the disc varies from normal to atrophy and cupping, the condition depending on the stage of the disease. Generally, there is less cupping but more atrophy than is usually seen in a comparable stage of open angle glaucoma. Tension may be normal or somewhat elevated between attacks. It is seldom higher than 50 or 60 during an attack. On gonioscopy, there is a marked convexity of the iris, especially of the peripheral portion. If the tension is normal, the angle may be open everywhere or a small portion may be closed. If the tension is elevated, a varying extent of the angle is closed. The upper portion of the angle usually closes first and the nasal portion last. With the tension elevated, one cannot tell whether closure represents simple contact or permanent anterior synechias.

Visual field changes depend on the degree of cupping and atrophy and, since atrophy is usually a more prominent feature than cupping, field defects are often surprisingly large. The usual provocative tests may be helpful in establishing the diagnosis when the ocular tension is normal. The moving picture and dark room tests were particularly valuable. Medical treatment consists in the use of the usual miotics in the usual manner. The goal is complete prevention of periodic rises of tension because with each rise in tension the greater the possibility of permanent closure by anterior synechia. Medical treatment is considered inadequate if it permits any significant rise in tension even though permanent loss of function does not result.

The authors believe that any failure of the aforementioned medical treatment justifies surgical intervention in early cases and that the operation of choice is peripheral iridectomy. They do not feel that filtering operations are logical or justified because when the angle is open the facility of aqueous outflow is normal. If the disease is moderately advanced, peripheral iridectomy and miotics may be necessary. If the glaucoma is already far advanced and a large portion of the angle is closed by anterior synechia, tension cannot be lowered with miotics and peripheral iridectomy is of no avail. For such cases, iridencleisis, with or without sclerectomy, is the recommended operation. The response to miotic treatment is a valuable guide as to whether or not peripheral iridectomy might control the glaucoma. If the tension can be brought to normal or nearly normal by the use of ordinary miotics every 3 or 4 hours and gonioscopy shows a large portion of the angle free of peripheral anterior synechia, then peripheral iridectomy is the operation of choice even though there is marked cupping and atrophy of the disc with marked field changes.

The authors believe that filtering operations, particularly iridencleisis, are frequently employed for the subacute type of angle closure glaucoma, irrespective of the stage of the disease, but, as indicated above, they think that peripheral iridectomy should be utilized more frequently.

A technique for peripheral iridectomy is described. It emphasizes the ab externo approach 2 mm. from the limbus under a flap with the smallest possible incision to admit small iris forceps. It is emphasized that the incision should be closed with a deep scleral suture. The day following surgery, the pupil is dilated with 10 per cent neosynephrine and is dilated daily thereafter until the eye is quiet. If postoperative iritis occurs, it is treated in the routine manner. Immediate postoperative rise in tension may occur because of closure of the angle from edema of the ciliary body and iris. Three case reports are presented.

—Andreas V. Mortensen, M.D.

NECK

Posterior Mediastinal Goiter; a Report of 11 Cases. KENNETH N. MORRIS. *Austral. N. Zealand J. Surg.*, 1955, 24: 241.

ELEVEN CASES of posterior mediastinal goiter are described. In all those cases in which the examination was made, radiologic screening demonstrated that the tumor moved when the patient swallowed. It is recommended that these tumors be removed by the cervical route when they are small, and by a combined cervical and sternum-splitting approach when they are large. *—Ely Elliott Lazarus, M.D.*

Hyperparathyroidism. W. F. SUERMONDT. *Arch. chir. Neerl.*, 1955, 7: 1.

THE AUTHOR surveys the clinical, chemical, and roentgenologic aspects of hyperparathyroidism in 13 cases. Repeated determination of hypercalcemia is the most important diagnostic aid, in combination with hypophosphatemia, hypercalciuria, and hyperphosphaturia. The alkaline phosphatase level of the blood shows a rise with increasing severity of the osseous changes. The diagnosis is supported by a low calcium level in the cerebrospinal fluid. Determination of the blood protein level and renal function tests are indispensable diagnostic aids. In the case of severe renal lesions, the blood calcium level may fall to normal values again because of the retention of phosphates.

Every one of the four parathyroid glands should be exposed at operation, as adenomas may be bilateral (in 2 of the 13 cases). Renal anomalies and hypertension have an unfavorable effect on the prognosis. Attempts should be made to ensure early diagnosis and treatment before irreversible renal lesions occur,

as the latter show exacerbation even when the hyperparathyroidism per se has been cured by extirpation of the adenoma. —*John J. Maloney, M.D.*

The Tracheotomy and Its Present Indications, Based on the Experiences of the ENT Hospital of the University of Heidelberg (Ueber die Tracheotomie und ihre heutige Indikation an Hand des Krankengutes der Univ—HNO Klinik Heidelberg). H. Masing and H. Kaess. *Chirurg*, 1955, 26: 196.

The authors discuss and tabulate the tracheotomies done at the University of Heidelberg's Ear, Nose, and Throat Department during the period from 1946 through 1954. Although the incidence of tracheotomies has dropped dramatically since the introduction of antibiotics it is still an important and often a life-saving operation.

The over-all number of patients treated in the department during the period was 2,957; tracheotomy was performed in 323 cases. In 126 of these (39 per cent) the intervention was required because of laryngeal diphtheria. This is explained by the severe diphtheria epidemic which hit Germany during the postwar years from 1945 through 1948, whereas during the years before the Second World War the number of tracheotomies for diphtheria was less than 1 per cent of all tracheotomies.

Next in frequency were tumors of the hypopharynx, the larynx, and the thyroid (71 cases); the other cases included foreign bodies, tuberculosis, laryngeal pareses and stenoses of various origins.

One case should be mentioned because of the extreme rareness of the affection. A woman 29 years of age suffering from erythema exudativum multiforme was admitted because of extreme dyspnea and had to be tracheotomized. Laryngoscopic examination revealed typical erythema multiforme of the vocal cords and the mucosa of the subglottis. The patient recovered only slowly under aureomycin and ACTH.

It is surprising that not one case of tracheotomy for bulbar poliomyelitis or other neurologic disturbances is recorded. The authors mention that although it has been recommended in the literature it has not been used for these conditions at the Heidelberg hospital. —*Werner M. Solmitz, M.D.*

Cancer of the Larynx; 5-Year Results, with Emphasis on Radiotherapy. C. C. Wang and A. R. O'Donnell. *N. England J. M.*, 1955, 252: 743.

Two hundred and fifty three cases of biopsy-proved carcinoma of the larynx seen from 1931 through 1949 at the Massachusetts General Hospital, Boston, form the basis of this report. They occurred in men nineteen times more frequently than in women and two-thirds of them were seen in the sixth and seventh decades of life. All but one were squamous cell carcinomas. The necessity for accurate determination of the anatomical extent of the lesion for the proper management of the disease and for estimating its probable outcome is emphasized. Subglottic extension frequently cannot be well visualized by direct or indirect laryngoscopy, but may be more completely demonstrated by roentgenography.

The cases are grouped into four stages according to the classification of Nielsen and Strandberg and the 5 year therapeutic results are discussed. The comparison is made between radiation and surgical therapy in each of the four groups, but all surgical procedures are considered together without any attempt to evaluate the efficacy of any particular surgical procedure which might have produced better results than some others. It is shown again that lesions limited to the vocal cords may be treated equally well with x-rays or surgery with a 5 year survival rate of 80 to 85 per cent. In lesions which have extended beyond the vocal cords surgery results in a better 5 year survival rate than x-ray treatment. The exception to this is when the extension is limited to the ventricular band. In these cases x-rays are usually as effective as surgery.

The authors describe in detail the plan of radiation which they use by which 5,000 to 6,000 roentgens are given over a 4 to 6 week period. They point out that no significant advantage as far as cure rate is concerned is obtained with supervoltage x-rays as compared with the 200 K.V. x-ray unit. —*David T. Petty, M.D.*

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Localization of Intracranial Lesions by Scanning with Positron-Emitting Arsenic. WILLIAM H. SWEET and GORDON L. BROWNELL. *J. Am. M. Ass.*, 1955, 157: 1183.

THE AUTHORS describe their technique for automatic continuous scanning of the head after the intravenous injection of positron-emitting arsenic[74] as a sodium salt. Two types of data are recorded simultaneously in records which they name a positrocephalogram and an asymmetrogammagram, respectively. The former record will locate accurately in the sagittal plane a small area of increased radioactivity, but gives no information as to the side or degree of lateralization of this area. This information is furnished by the latter record. The time required for scanning the entire head is one hour, during which the patient lies comfortably supine with the head gently fixed in position. The procedure is carried out within a few hours after the injection and is usually repeated without an additional injection of isotope the following day.

Of a total of more than 250 patients studied by the method, report was made on 216 in whom the final diagnosis was reasonably certain. Included were 123 patients with verified intracranial tumors, 6 with abscesses, 1 with cysticercosis of the fourth ventricle, 1 with a subfrontal mucocele, and 3 with subdural hematomas. The method has proved sufficiently sensitive to yield clear-cut positive results in 2 patients in whom both arteriography and pneumoencephalography had recently failed despite technically useful filling.

The method also proved to be of aid in the avoidance of fruitless surgery, as in the demonstration of two or more foci with increased uptake of As[74], especially when there was clinical reason to suspect metastatic tumor. The best results were obtained in cases of meningioma, which usually takes up much larger amounts of the arsenate than does the normal brain. The results are tabulated and discussed for diagnosed intracranial lesions including neoplasms, abscess or cysts, and disorders of the blood vessels of the brain.

The advantages of the method are:

1. It is harmless, painless, and simple.

2. The data automatically evolve pictorially, so that their preparation and interpretation require only a few minutes.

3. The localization in the sagittal plane is more precise than that obtainable when total gamma radiation only is counted. It guides the surgeon well for his exposure, eliminating the need for arteriography or pneumoencephalography in a growing number of cases.

4. Accuracy is now about 75 per cent for tumors and 83 per cent for abscesses. Only 17 per cent of the patients with cerebral thrombosis or hemorrhage showed abnormal scans.

—John L. Lindquist, M.D.

The Pathogenesis of Injury Due to Contrast Media in Cerebral Angiography and Its Avoidance (Uber die Pathogenese von Kontrastmittelschaden bei der zerebralen Angiographie und ihre Vermeidung). K. HOLUB. *Klin. Med.*, Wien., 1955, 10: 45.

A CLINICAL STUDY of 700 cases of carotid arteriography revealed that diodon was used as a contrast medium in 400 cases, and diodon D in 300 cases. Both substances were administered in 35 per cent solution and in similar amounts. There were eight severe reactions following the use of diodon as compared to one severe reaction with the use of diodon D. Secondary reactions without serious sequelae were more frequent than severe reactions and occurred 55 times with diodon as compared to 6 times with diodon D.

In a series of animal experiments, a comparison was made between the effects of injection of diodon and diodon D on the blood-brain barrier. Following injection of the contrast medium a solution of astraviolet stain was injected and the brains of the animals were examined. Staining of the hemispheres indicated damage to the blood-brain barrier. No statistically significant difference in the incidence of damage was found between the diodon and the diodon D experiments.

The results of the clinical study based on the incidence of secondary reactions indicated that diodon D is superior to diodon as a contrast medium. The experimental study comparing effects of the two media on the blood-brain barrier, however, revealed no significant pathologic differences. On the basis of these facts, the author concludes that secondary reactions and probably also severe reactions following cerebral angiography cannot be exclusively attributed to disturbances in permeability of the blood vessels of the brain. Other factors leading to structural changes in brain tissue following injection of the diodrast group of drugs must be considered in the pathogenesis. It would appear that angiospasm is an important factor.

To avoid contrast medium damage, strict indications for cerebral arteriography must be observed and the least harmful medium should be employed. In the experience of the author, 35 per cent of diodon D is preferable to 35 per cent diodon.

—John L. Lindquist, M.D.

Trial of a New Treatment of Inoperable Cerebral Tumors; Placement of Radioactive Gold by Stereotaxie (Essai d'un nouveau traitement des tumeurs cérébrales inopérables; mise in place d'or radio-actif par stéréotaxie). J. TALAIRACH, J. ABOULKER, G. RUGGIERO, and M. DAVID. *Sem. hôp. Paris*, 1955, 31: 548.

THESE AUTHORS think that with the recent marked progress in neuroradiology it is possible to decide preoperatively as to the operability of an intracranial tumor. They believe that angiography, but more especially fractional pneumoencephalography, has enabled them to do this and that the latter technique should

enable the radiologist to diagnose not only the extent of infiltration but also whether or not a tumor is infiltrating. With this information available, they question whether or not the surgeon is justified in operating upon all intracranial tumors, and they themselves think he is not. They consider not only tumors lying in the central structures as inoperable but also hemispheric tumors which have demonstrated extension toward the central structures. For an example, they give a case of a temporal glioma extending toward the basal ganglia and state that it is preferable to let the patient survive sometime with his family without operation rather than have him die in surgery or survive some months with such defects as to leave doubt as to the value of the treatment. However, even though this approach may be considered a satisfactory one for the patient, the authors think that it leaves some things to be desired insofar as the surgeon and family are concerned. For this reason they felt justified in attempting a new approach to the problem, that is, the placement of radioactive gold in the tumor which has been accurately localized by "radiostereotaxic" methods, thus reducing the operative trauma to a minimum.

They describe their technique, which consists first in taking a fractional encephalogram, anesthetizing the patient, placing him in the stereotaxic apparatus, and, after having placed several properly located trephine openings, introducing a cannula to perhaps drain a cyst or a Selverstone counter to obtain counts from previously injected radio dye as a supplement. A biopsy is made and then an average dose of 20 to 60 mc. of gold is inserted. This method has been used in 5 cases.

It is of interest to note that the preoperative diagnosis was not always correct and 1 patient who had a deep-seated epidermoid was thought to have an astrocytoma. The procedure provoked a hemorrhage with an eventually fatal outcome. In another patient a cystic tumor was entered and the gold was implanted in the cyst. This patient also died and at autopsy the tumor, a metastasis, was discovered near by. The results were much more encouraging in the 3 other patients, one of whom apparently had a tumor near the corpora quadrigemina. In another, postoperative encephalography showed a marked improvement, and in all 3 a marked diminution of intracranial tension was observed.

This work is certainly a new approach to the problem and would seem to be of great promise should more accurate methods of preoperative diagnosis be obtained. —*Nicolas Wetzel, M.D.*

Meningeal Sarcoma with Extracranial Metastases. HAROLD J. ROSEN and ARNOLD BRANCH. *Canad. Services M. J.*, 1954, 10: 153.

THIS CASE is reported not only because of the relative rarity of meningeal sarcoma but because of the extracranial metastases, in this case to the liver.

Since 1946, this 44-year-old male had complained of pain in the right chest for which he had been admitted to the Lancaster Hospital, Lancaster, New Brunswick, on several occasions. In April 1953, the pain in the chest recurred and he was re-admitted in May 1953. A diagnosis of rheumatic cardiac aortic valvular disease with bundle branch block was made. During this hospital stay there were intermittent and increasing periods of unusual drowsiness.

He was admitted to the Neurosurgical Service of the Saint John General Hospital in a drowsy state but he was able to answer questions, though he did not co-operate fully. Marked papilledema was seen, more on the right than the left. Neurologic examination was otherwise within normal limits. General physical examination, excepting the heart, was not remarkable.

Laboratory examination revealed little except some cardiac enlargement and increased diameter of the aorta. X-rays of the chest and skull were unrevealing. The pineal body was not visualized. The electroencephalogram showed damage to the frontal lobes, especially the left. Ventriculography was carried out and generalized internal hydrocephalus was seen with evidence of a space-occupying lesion in the right temporal region. At operation, a tumor was seen coming to the surface at the middle temporal convolution, but when traced downward it was found to be attached to the petrous ridge and the middle fossa. Parts of the tumor were soft, and other parts firm in consistency, but in general it was vascular. Nearly all of the tumor was removed, including the tip of the temporal lobe, but it was found that a posteromedial extension could not be excised. Following operation he had a somewhat stormy course, but after 2 weeks it was possible to give the patient deep x-ray therapy. He received 5,000 roentgens over a period of 4 weeks. He was dismissed in good condition. About 6 weeks later he was re-admitted with hematuria, and a papilloma of the bladder was removed. There was no evidence of malignancy. One month later he died.

At postmortem examination some remaining cerebral tumor was found attached to the tentorium. Three white-surface nodules were found in the liver, from 3 mm. to 1 mm. in diameter. The rest of the examination was not remarkable.

The surgical specimen, the remaining tumor tissue in the cranial cavity, and the liver nodules all revealed similar histologic pictures. Spindle-shaped, fusiform cells were arranged in strands with distinct whorl formation in places. Giant cells were seen, as were mitotic figures. A review of the case led the authors to the conclusion that the tumor was a meningeal sarcoma with metastases to the liver. The histologic opinion is supported by illustrations.

—*Adrien VerBrugghen, M.D.*

Affections of the Acoustic Nerve in Occipitovertebral Malformations (L'Atteinte du nerf auditif dans les malformations de la charniere occipito-vertebrale). G. LAZORTHES and J. COLL. *Presse méd.*, 1955, 63: 239.

THE AUTHORS have studied 94 observations recorded in the literature and add 6 personal cases of malformations of the occipitovertebral region due to acquired lesions such as Paget's disease, or to congenital malformations of the bone, such as basilar impression, or to congenital malformations of the nervous tissue such as the Arnold-Chiari malformation. In Paget's disease of the skull auditory difficulties occur frequently and early, and those of vestibular function later. In congenital bony anomalies, eighth nerve difficulties (particularly vestibular) occur in two-thirds of the cases

and are often the first manifestation. In vertebral malformations, such as occipitalization of the axis, auditory difficulties occur only if there is an associated cerebromeningeal anomaly. In the Arnold-Chiari malformation, difficulties in equilibrium occur frequently, more so than lesions of other nerves and functions of the posterior fossa because of involvement of the cerebello-vestibular pathways. The authors believe that in these conditions a complete examination of the vestibular and cochlear function rarely reveals normal conditions. —*Nicolas Wetzel, M.D.*

PERIPHERAL NERVES

The Place of Nerve Grafting in Orthopedic Surgery. DONAL BROOKS. *J. Bone Surg.*, 1955, 37-A: 299.

THE AUTHOR'S OBSERVATIONS on nerve grafting are based on a review of 93 patients treated during the last 12 years in one surgical center.

End-to-end suture still remains the method of choice for repairing divided nerves, but nerve grafting becomes necessary when end-to-end suture is impossible or undesirable. Although it may be possible to close an extensive gap by full mobilization of the proximal and distal stumps, postoperative stretching may produce a traction lesion causing intraneural fibrosis and result in little or no recovery. A useful working rule is that a nerve graft should be employed if the gap after mobilization cannot be closed by flexion of the main joint to a right angle, as, for example, the knee joint in the case of the sciatic nerve and the elbow in lesions of the median and ulnar nerves. In the case of partial lesions of a mixed nerve the defect created by resection of the lateral neuroma can be neatly bridged by means of an inlay nerve graft. In many hand injuries with concomitant nerve and tendon damage, the optimal position of joint flexion for tendon repair rarely coincides with that suitable for nerve suture. Nerve grafting provides a means of overcoming this difficulty. Similarly, grafting is necessary for restoring nerve continuity when joint stiffness interferes with the usual method of nerve mobilization.

The possible causes of failure in nerve grafting are reviewed under two headings: technical and theoretical objections. Technical failure has resulted in the past from the lack of appreciation of principles that apply to all peripheral nerve surgery. For example, nerves were repaired long after the original injury, when irreversible changes had occurred in the paralyzed muscles that precluded any hope of motor recovery. Resection of the neuroma was often inadequate so that axonal regeneration was hindered. A single strand of a cutaneous nerve was used to bridge a gap in a main nerve trunk, thus limiting the number of regenerating axons. Finally, homografts were found to be useless in man because of the reaction of immunity which they produced.

With respect to some of the theoretical objections to nerve grafting in the past, it has been shown that regenerating motor nerve fibers can grow into and enlarge the smaller tubes of the graft which normally accommodate sensory nerve fibers. It has also been shown that the use of predegenerate grafts is no more successful than the use of those taken from the proximal stump. Histological studies have shown that Schwann cell activity is greatest in the distal stump so that the distal junction is the better of the two.

Having examined some of the causes of failure in the past, the authors have evolved a series of working rules for nerve grafting:

1. The general principles that apply to all peripheral surgery with regard to the adequacy of resection and the time that has elapsed since injury must be observed.

2. The cross-section area of the graft or grafts must equal that of the nerve to be repaired.

3. The graft should be 12 to 15 per cent longer than the gap to be filled in order to allow for shrinkage.

4. The bed for the graft must be free from scar tissue to facilitate revascularization.

Cutaneous nerves are usually employed for grafting material. The common donors in the upper limb are the medial cutaneous nerve of the forearm taken from the upper arm and the superficial branch of the radial nerve in the forearm; in the lower limb the donors are the saphenous and sural nerves. When two main nerves are extensively damaged at the same time, the less important nerve may be used to graft the other.

There are four types of nerve grafts: (1) digital—free grafts, (2) inlay—free grafts, (3) cable—free grafts, and (4) main trunk—free and pedicled grafts.

The use of each of these types is discussed at some length.

The results of autogenous nerve grafting in 93 cases are tabulated. Significant features of the summary of the results are: (1) in the limited number of pedicled nerve grafts (5 cases) an excellent recovery has been made in all patients; (2) The results of sciatic nerve grafting have been consistently poor; (3) digital nerve grafting has been uncertain in its results; and (4) all other forms of nerve grafting have given useful recovery in more than 50 per cent of the patients. The most important single factor contributing to the success of a nerve graft must be adequate revascularization of the graft. —*John L. Lindquist, M.D.*

MISCELLANEOUS

Surgical Treatment of Raynaud's Syndrome of the Upper Extremity (Chirurgische Behandlung des Raynaud-Syndroms der oberen Extremitaet). A. TEMESVÁRI, L. SOLTÉSZ, and F. ROBICSEK. *Chirurg*, 1955, 26: 70.

TWENTY PATIENTS with Raynaud's syndrome were operated upon by the authors at the postgraduate surgical clinic of the University of Budapest, Hungary, by the method of Smithwick (*N. England J. Med.*, 1940, 222: 699; INTERNAT. ABST. SURG., 1940, 71: 320). Five of these patients were observed postoperatively for more than 3 years and 4 were free of symptoms. Fifteen were observed for from 6 months to 2 years; all of these were free of symptoms, even the 2 with marked induration of the tissues of the fingers, as after the operation the movement of the fingers had become freer. In 12 of the patients the Smithwick operation was done bilaterally.

The complications have been injury to the pleura, bleeding, loss of cerebrospinal fluid, commotio spinalis (one mild instance of paresis of the lower extremities) and Horner's syndrome (transient); however,

these complications left no permanent sequelae and did not affect the frequently excellent quality of the operative results.

The case of the patient in whom success was not achieved with the Smithwick procedure is reported in detail. This 41 year old male was one of the earlier patients received at the clinic; in fact, he was the first in this series to undergo the operation. He had undergone physical and emotional trauma of severe character some 3 years previously. Currently he presented a Raynaud syndrome of all 4 extremities associated with disturbances of the erective power of the sex organ.

The first operation was a stellectomy on the left side with surprising results: the disturbances of the lower extremities and of the sex organ disappeared completely, but the disturbance of the upper extremity were uninfluenced.

The second operation was a Smithwick on the right side. This was completely successful; in that the attacks of syncope of the right upper extremity ceased entirely.

The third operation was a Smithwick on the left side. Here, due to a technical error, the fourth rib was resected instead of the third, and the third and fourth ganglia instead of the second and third ganglia were removed. The sympathetic trunk was divided between the fourth and fifth, instead of the third and fourth spinal ganglia. Here another surprise was encountered; the patient again became totally impotent and the Raynaud syndrome reappeared in all four extremities.

The experience of the authors with the last case led them to believe that in Raynaud's syndrome the sympathetic nervous system plays only an intermediary role between the traumatized higher centers of the brain and the peripheral effector organs. The sympathetic nervous system also differs from the rest of the nervous system in it physiologic functioning; the functioning of the motors nerves, for example, does just one thing, while the sympathetic system is not so simple in its manifestations; it may, in fact, reply to an identical stimulus in a paradoxical manner.

In conclusion, the authors emphasize the importance of arteriography and of novocain blockade of the second and third thoracic spinal ganglia and sympathetic trunk in the diagnosis of the condition. This novocain blockade is also of great prognostic import, since the Smithwick operation is, of course, not indicated except in the instances in which the arterial walls are still capable of being dilated, viz., in the spastic phase of the disease. If there is no significant rise in the temperature of the fingers with this procedure, there is not apt to be anything to be gained by the operation. This does not mean, however, that the patient is to be abandoned; the use of the newer sympathicolytics, in fact, frequently enables the maintenance of a permanent freedom from symptoms, and even in the patients with old, perhaps obliterated, digital arteries, a considerable warming up and relief of subjective suffering can be achieved. If, however, the medical treatment does not maintain freedom from symptoms, or if trophic disturbances occur, the operation is indicated. —*John W. Brennan, M.D.*

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Bilateral Simultaneous Breast Cancer. WALTER W. CARROLL and THOMAS W. SHIELDS. *Arch. Surg.*, 1955, 70: 672.

THE OCCURRENCE of bilateral breast carcinoma is not difficult to imagine, since both breasts have the same structural pattern and the same genetic background, and are under the same hormonal influences. Despite this, the vast majority of patients (96%) has unilateral disease.

The following criteria for the diagnosis of simultaneous breast cancer have been fixed:

1. The patient must present clinically independent lesions in each breast when first seen and be free from evidence of metastatic lesions.

2. The history must be that of concomitant development of independent tumors.

3. The clinical course following bilateral mastectomy must be free from evidence of early local recurrence, which would suggest that the bilaterality of the process was merely metastatic in nature.

The identification of simultaneous mammary carcinoma is, thus, dependent not only on the clinical findings, but also on the course of the patient after treatment. If the local lesions are resectable and metastatic disease can be excluded, the treatment of choice is bilateral radical mastectomy, after frozen section proof of the character and individuality of each lesion. The operations may be performed either simultaneously or consecutively, as may be preferred by the surgeon.

The prognosis is not as favorable as it is in cases of unilateral carcinoma or nonsimultaneously occurring bilateral disease, but it is not at all hopeless.

—Samuel Kahn, M.D.

Three Year to Forty Year Survival Rates Following Radical Mastectomy for Carcinoma of the Breast. STUART W. HARRINGTON. *West. J. Surg.*, 1955, 63: 272.

IN THE present article the author gives the 3-year to 40-year survival rates following radical mastectomy in 8,796 cases of carcinoma of the breast in which operation was performed at the Mayo Clinic from 1910 to 1949 inclusive. Data were analyzed to show influence of the most important factors on prognosis. In this series any lesion of the breast was considered to be operable, regardless of ulceration, if it was freely movable from the thoracic wall.

The average percentage of patients with axillary nodal metastasis (proved by microscopic examination of the axillary lymph nodes following radical mastectomy) was 57.0 per cent. In the last 7 years of this study it has been less than 50 per cent. The proportion of the group of traced patients who did not have axillary metastasis and who were living 3 years or more after the operation was 86.4 per cent, or almost twice as large as that for the group who had axillary metastasis. In cases of axillary nodal metastasis, the results of postoperative irradiation therapy in the different 5-year groups were not uniform or consistent. The total shows an improvement of approximately 8 per cent in those patients who underwent irradiation as compared with those who did not undergo it. For the entire group a consistent and appreciable improvement in the results obtained from radical mastectomy in each succeeding 5-year period was evident.

The half decade of life from 55 through 59 years showed the highest percentage of patients who had axillary nodal metastasis at the time of operation (62.1 per cent). The highest percentage (36.6 per cent) of patients with axillary nodal metastasis who survived 5 years following operation was of those between the ages of 60 and 69 years, and the lowest percentage (23.6 per cent) of patients who survived the same period was of those less than 30 years of age.

A study was made of the survival rates, following radical mastectomy of the special groups of patients who had associated conditions which influence the prognosis, such as lactation, pregnancy during or subsequent to radical mastectomy, bilateral oophorectomy at least 1 year prior to the radical mastectomy, or diabetes at the time of operation. These special studies indicated that there is a wide variation in the survival rates and that an important factor which influences prognosis may be present in the normal tissues of the body.

A Case of Giant Myxoma of the Breast, or Cystosarcoma Phylloides. P. VAN DOOREN. *Arch. chir. Neerl.*, 1955, 7: 17.

A CASE of "giant myxoma of the breast" is reported; the pathological aspects of the tumor are as follows:

The tumor is made up of connective tissue and granular elements. The ducts are frequently dilated to cystic proportions but some are compressed by the surrounding connective tissue. The connective tissue elements in places are loose and myxomatous. The cellular elements throughout both connective tissue and epithelium are regular.

A separately submitted specimen of skin shows no remaining epidermis. The surface is covered by a purulent inflammatory reaction and the bulk of the tissue shows an architecture similar to that described.

The diagnosis was ulcerated giant myxoma of the breast. It appeared to be benign.

—John J. Maloney, M.D.

Reticulum Cell Sarcoma of the Breast: Report of 3 Cases (Il reticolo-sarcoma della mammella: considerazioni su tre casi personali). A. SETTIMI. *Arch. ital. chir.*, 1954, 79: 177.

THE AUTHOR reports on 3 malignant tumors of the breast which he classifies as arising from the reticuloendothelial system, and has compiled 12 similar cases from the European literature. In some of the collected cases, serious questions are raised as to whether they are hemangioendotheliomas or angiosarcomas.

Of the 3 patients reported, all were female, and the follow-up of all 3 was only of 2 years' duration. They

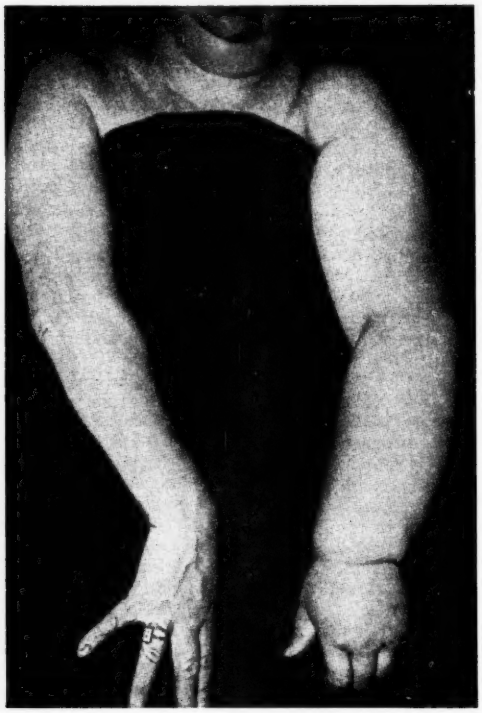


FIG. 1 (Gumrich, Kübler). Elephantiasic swelling of left arm after radical mastectomy 11 years previously.

were treated with radical surgery and showed no evidence of disease at the end of that time.

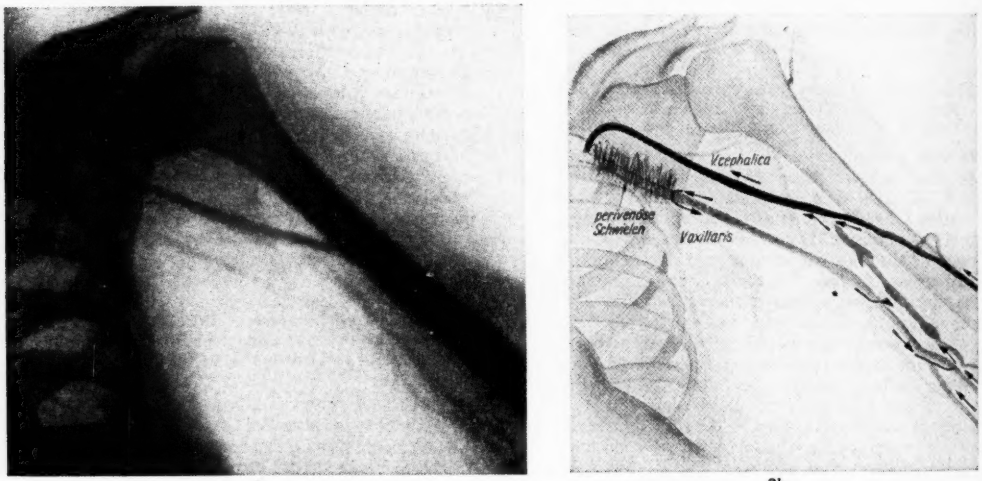
The photomicrographs presented are suggestive in one instance of a hemangioendothelioma. The remainder of the tumors appear to be reticulum cell sarcomas. —*Alexander J. Conte, M.D.*

Discussion of the Pathogenesis of Venous Edema of the Arm After Radical Mastectomy, and Its Importance for Surgery (Zur Klaerung der Genese des Armstaus nach Mammaradikaloperation und seine chirurgische Bedeutung). H. GUMRICH and E. KÜBLER. *Chirurg*, 1955, 26: 204.

THE AUTHORS, of the Surgical Department of the University of Tuebingen, Germany, discuss the pathogenesis and the surgical treatment of arm edema after mastectomy. Sometimes these edemas develop soon after the operation, but more often they develop years later, and may lead to extreme elephantiasis. In 10 cases in the literature a lymphangiosarcoma developed in the elephantiasic arm.

In a series of 204 patients observed by the authors, light edema (up to a difference of 2 cm. in arm circumference) developed in 45.6 per cent and, severe edema (up to a 16 cm. difference) in 20.5 per cent.

In 32 patients serial phlebograms were taken. The contrast material was injected either in the basilica vein or, in very severe edemas, in a vein of the dorsum manus. In all cases more or less marked stenosis or complete obstruction of the brachial and axillary veins was found. The degree of obstruction was directly proportional to the severity of the edema. In cases of marked edema complete obstruction of the axillary vein with collateral circulation via the cephalic vein was found, whereas in light and medium swelling of the arm a stenosis of the veins was revealed in the phlebogram.



2a 2b

FIG. 2. Partial filling of the axillary and brachial veins, reflux via communicating veins to the cephalic vein with widened lumen and marked intensity of the shadow. At the level of the axilla the axillary shadow is interrupted. X-ray diagnosis: stenosis and obstruction of the deep veins by pressure of scar tissue.

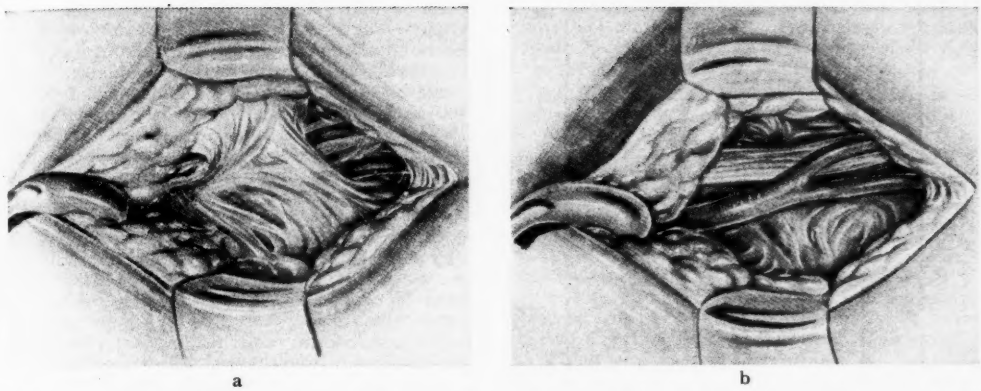


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FIG. 3 Gumrich and Kübler. Sketches of the operation. a, Compression of axillary vein by fibrous tissue. b, After resection of the compressing fibrous tissue the axillary vein widens to two-thirds of normal.

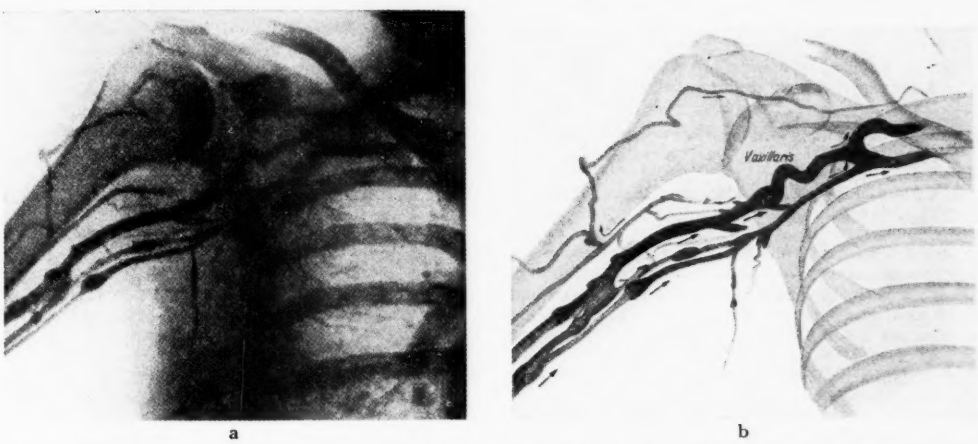

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FIG. 4. The postoperative phlebogram shows that the axillary veins are again pervious although the collateral routes are still present.

Although the edema may be caused by pressure of tumor metastases on the vein or by thrombosis, most cases were due to strangulation by perivenous scar tissue. In 27 of the 32 patients of whom phlebograms were taken the swelling was due to perivenous adhesions, in 3 it was due to thrombosis, and in 2 it was due to metastases.

The perivenous adhesions originate from fibrous induration of the tissue after surgery or from postoperative infections or hematomas. To prevent these complications the authors use a modified Kocher incision reaching up to the acromion and insert the minor pectoralis muscle in the axilla after evisceration so that the muscle forms a fan-shaped covering for the blood vessels and nerves. To prevent the formation of hematomas or seromas a large foam rubber pad is applied over the entire field for 2 or 3 days after the operation. Removal of the scar tissue brought about complete cure of the elephantiasic swelling in the majority of the cases. —*Werner M. Solmitz, M.D.*

TRACHEA, LUNGS, AND PLEURA

Sleeve Resections of the Trachea; Experimental Studies on Regenerative Capacity and Principles of Reconstruction and Repair. H. MASON MORFIT, ADRIAN J. NEERKEN, ARTHUR PREVEDEL, EDWARD B. LIDDLE, and LAWRENCE KIRCHER. *Arch. Surg.*, 1955, 70: 654.

THE TRACHEA has no more unique capabilities of repair and regeneration than does the skin, bone, or cartilage. Obstruction of the airway by granulation tissue from the raw tracheal stumps or the adjacent soft tissue bed is the cause of failure of most repairs. Host structures cannot be counted upon to form a rigid, serviceable conduit after removal of a stent.

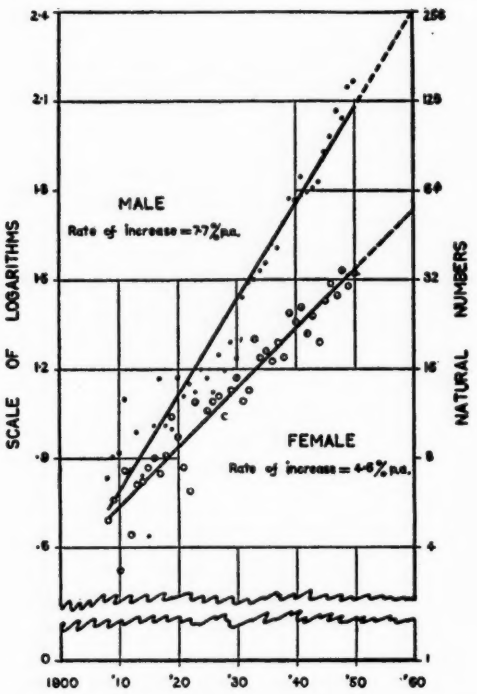


FIG. 1 (Fowler). Bronchial cancer mortality by sex. Trend of rates per million in Australia from 1908 to 1950. Sex-specific trends of lung cancer mortality. Trend lines have been mathematically fitted, the equations being: Ym equals 2.9233 $(1.0767)^x$, origin 1900; Yf equals 3.5547 $(1.0461)^x$, origin 1900. The difference in slope is highly significant ($P<0.001$).

Any scheme of repair, therefore, must include the insertion of a nonpermeable tube affixed inside of the raw tracheal ends with nonabsorbable sutures. These should preferably be anchored to adjacent structures that possess the ability to give with stress.

Experimental and clinical experience suggest that the insertion of this tube should be looked upon as permanent, since there is no safe period after which the stent can be safely removed. Polyethylene is as serviceable as any material available for this purpose.

A scheme for fixation of this prosthesis is suggested on the basis of experimental trial in animals.

—*Samuel Kahn, M.D.*

Some Observations on the Epidemiology of Lung Cancer. ROBERT FOWLER. *Med. J. Australia,* 1955, 1: 485.

CARCINOMA of the lung as a mass phenomenon is the concern of epidemiologists, particularly with regard to its prevalence and to the necessary remedial administrativeand medical counter measures. A detailed record of cancer experience in 6 public hospitals in Melbourne, Australia was maintained for 10 years. It revealed that admissions for bronchial cancer had tripled, that the ratio of males to females never fell below 4 to 1 and that the incidence of lung cancer increased in relation to other forms of carcinoma.

Statistical analysis based on grid graphs indicates the rising death rate of carcinoma of the lung in Australia to be exponential in character, hence increasing from year to year in the form of a geometric progression. Based on this data, the progressive death rate will reach 142 persons per million people in 1960 in Australia. From other demographic studies, it has already been shown that the same geometric progression of increased rate of respiratory cancer holds for every age regardless of such factors as aging of the population or improved diagnostic methods. Evidently respiratory cancer seems to be a natural response to pathogenic forces rather than a "Rip Van Winkle awakening to an epidemiological situation."

At the present time, the responsibility of treatment of respiratory cancer rests upon surgeons and radiologists. The results of treatment by the latter do not, however, fulfill the requirements of epidemiological control. A series of 1,000 consecutive cases of bronchial carcinoma revealed the following: 51.5 of all were 60 years of age or over; the masculinity rate was 80.4 per cent; the thoracotomy rate was 19.3 per cent, and 75.4 per cent of diagnoses were verified by biopsy and necropsy. The classical symptomatology of cough, dyspnea, hemoptysis, and pneumonia is dependent upon excitation of reflex action, bronchial blockage,

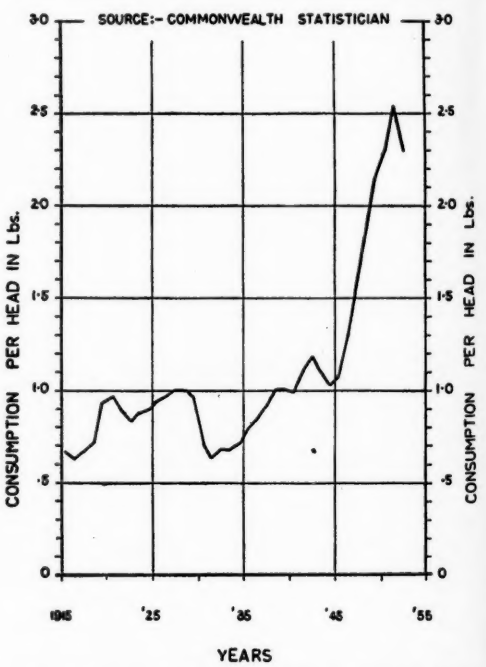


FIG. 2 (Fowler). Cigarette smoking in Australia from 1915 to 1916 and 1952 to 1953. Trend of consumption.

ulceration, and secondary infection. In 48 per cent of patients the time lag between the onset of symptoms and admission is over 6 months and in 27 per cent it exceeds 12 months. It is obvious therefore that the initiative rests with the patient. As long as this remains so there is no prospect of earlier case findings. Added to human inertia, the insidious onset and the stealthy progress of this disease must also be included. A circumscribed opacity found on roentgen examination, which appears as a pneumonitis and fails to clear promptly with chemotherapy, should be regarded as malignant and an exploratory thoracotomy should be done without hesitation. Mass chest x-rays fail to provide complete detection for lung cancer because the older age groups in the Victorian Chest X-ray Survey failed to subscribe to this service as did the younger age group.

With regard to respiratory cancer and smoking, the following facts are significant. Since 1950, tobacco consumption has risen to 5 pounds per head and amounts to drug addiction. There appears to be a causal connection between lung cancer and smoking and the risk seems to increase with the amount smoked. The Minister of Health is faced with the problem of preventability as a means of epidemiological control and in the province of preventive medicine.

—B. G. P. Shafiroff, M.D.

HEART AND PERICARDIUM

Congenital Cysts of the Pericardium (Kongenitale Herzbeutelzysten). G. GRUNDMANN, R. FISCHER, and G. GRIESSER. *Thoraxchirurgie*, 1955, 2: 492.

AN INCREASED INTEREST in intrathoracic cysts parallels the increased frequency of thoracic surgery. The cysts intimately associated with the pericardium are of special interest. They may be either congenital or acquired. Acquired cysts are of inflammatory or of traumatic origin. They are less common than congenital cysts and have thicker walls, in which microscopic evidence of inflammation remains. Congenital cysts have thin walls lined by a single layer of endothelial (mesothelial) cells. A number of embryologic explanations may be used to account for coelomic cysts in the region of the pericardium. It is not always possible to tell whether such cysts were isolated from the developing pericardial, pleural, or peritoneal cavities. Cysts of coelomic origin can be differentiated from lymphangiomas. The latter are usually attached over a wide area and have an equally widely distributed blood supply. Coelomic cysts usually have a stalk which carries their blood supply. They contain a transudate resembling pericardial fluid, and have no smooth muscle in their walls.

The authors collected 91 congenital cysts of the pericardium from the literature, and add one of their own of which they give a detailed report. Congenital cysts of the pericardium usually lie in the anterior mediastinum, in the pericardiophrenic angle. Only 10 per cent are found at the level of the auricles or higher. They occur slightly more frequently on the right than on the left, and are more frequent in males (61.5%) than in females (38.5%). There are usually no adhesions to adjacent structures. The cyst cavity is lined by endothelium varying from the cuboidal to the flat type (mesothelium). The larger the cyst, the flatter are the lining cells. Acquired cysts are more frequently widely attached, especially over the right auricle and up to the hilus, and they may be multiple. Their content varies with their origin: bloody to xanthochromic if traumatic and exudate if inflammatory.

The symptoms produced by congenital pericardial cysts are related to their size, location, and complications. Thirty-eight (41.7%) of the 91 patients in the literature had no symptoms. Twenty-four patients had pulmonary or pleural symptoms including cough, dyspnea, expectoration, or pain. Cardiac symptoms, which may be caused directly by tension or indirectly by vagal reflex, were found in 15 patients. The authors' patient complained of a sensation as from a foreign object in the chest, especially while stooping or sitting, and during such periods he had pulse changes. These cysts may become infected secondarily from an adjacent pneumonitis.

Since 90 per cent of pericardial cysts are found in the anterior mediastinum, in the pericardiophrenic angles, roentgenologic differentiation from malignant neoplasms, which are usually situated higher and more posteriorly, is not often difficult. Thymic tumors and cysts are usually in the anterior superior mediastinum, dermoids in the anterior middle mediastinum, and cysts of entodermal origin in the posterior inferior mediastinum. Bronchography and angiography are superfluous. Repeated roentgenograms reveal very slow growth in these cysts. Hard films to differentiate the diaphragm, upper gastrointestinal studies to exclude hernias, and examination following pneumothorax may be of help. Diagnostic aspiration is not recommended. Thoracotomy is often the only sure diagnostic means, and surgery is the indicated therapy.

—Elmer V. Dahl, M.D.

Lymphangiomatous Tumors in the Pericardial Region (Ueber lymphangiomatoese Tumoren im Herzbeutelbereich). GERD GRIESSER. *Thoraxchirurgie*, 1955, 2: 479.

MEDIASTINAL LYMPHANGIOMAS are rare. Only 18 are included in 1,460 mediastinal tumors collected from the literature to 1952. The present study concerns 3 cavernous lymphangiomas, each intimately associated with the pericardium. In case 1, that of a 40 year old male, enlargement of the cardiac shadow at its apex was reported on routine chest x-ray. Four years later there was mild respiratory difficulty and increased fatigability. On roentgenography there was now a loss of the cardiac convexity, with a polycyclic outline.

Thoracotomy was performed with a preoperative diagnosis of tumor of undetermined type. A 28 by 17 by 6 cm. cystic tumor covering the left lateral aspect of the pericardium from diaphragm to base was removed. Its arterial supply came from the left common carotid artery. Its veins drained into the innominate vein. A second cystic tumor, half as large as a hen's egg, was found more cephalad, near the innominate vein. Microscopically, a cystic lymphangioma, in whose walls thymic tissue remained, was described.

Case 2 was that of a 5 year old boy in whom an abnormality of the left cardiac border was discovered at age 2 on a roentgenogram taken during a pneumonia. Three years later a lateral view of the chest

showed a triangular shadow in the pericardiophrenic angle. Angiocardiography indicated its extracardiac location.

Thoracotomy disclosed a smooth palm-sized polycystic tumor localized to the left lateral and dorsal surfaces of the pericardium and so intimately associated with it that the outer layer of the parietal pericardium had to be dissected off with the tumor, which was firmly adherent to the diaphragm as well.

Case 3 was that of a 5 year old girl of whom a chest roentgenogram during an episode of pertussis at age 4 had demonstrated a polycyclic shadow at the left cardiac border. Angiocardiography showed the lesion to be separate from the left ventricle. At thoracotomy a multicystic tumor intimately associated with the pericardium, adherent to the diaphragm, and completely surrounding the left phrenic nerve, was removed.

No symptoms attributable to the tumor were elicited from the 2 children, nor were there any abnormal physical or laboratory findings. Microscopic examination demonstrated each of the tumors to be a cavernous lymphangioma with cystic spaces of various size.

In case 1 the location and vascular supply of the tumor, as well as the retained thymic tissue, suggest its origin from the thymus. Whether it was congenital or acquired remains unproved, although the size of the cysts suggests the former. The 2 other tumors were considered congenital, arising from the pericardial lymphatics. None of the patients had any symptoms from nerve compression or circulatory disturbance. Absence of such symptoms may be a point in differentiating these tumors from malignant neoplasms of equal size.

In diagnosis, roentgenography and angiocardiography offer the most valuable aid. In each of the 3 cases of this study, the tumor presented as a homogenous soft tissue density, sharply demarcated ventrally, dorsally, and laterally, and merging with the heart shadow medially. In 2 the contour was polycyclic. Cardiac pulsations were not apparent in the region of distortion of the cardiac shadow.

The nature of these tumors cannot be ascertained with certainty before operation. Surgery is indicated in each for that reason and to avoid symptoms which must arise when the tumors become large enough to occupy significant thoracic space. Complete removal of each of these 3 tumors was possible by transthoracic approach with subperiosteal resection of a single rib. Nine and 5 year follow-ups in cases 1 and 2 indicate no recurrence. —*Elmer V. Dahl, M.D.*

ESOPHAGUS AND MEDIASTINUM

Late Reconstruction of Congenital Esophageal Atresia by Intrathoracic Colon Transplantation. W. Andrew Dale and Charles D. Sherman, Jr. *J. Thorac. Surg.*, 1955, 29: 344.

The optimal repair of congenital tracheoesophageal fistula of the infant at present consists of ligation of the fistula and the establishment of alimentary canal continuity by primary end-to-end esophageal anastomosis. In some instances primary suture of the proximal esophageal pouch to the distal esophagus is difficult or impossible because of the great distance between the esophageal ends. This situation has generally been managed by one of 3 methods: (1) mobilization of the entire distal esophagus and upper stomach to allow end-to-end esophageal anastomosis; (2) gastric mobilization and intrathoracic gastric transplantation to permit esophagogastrostomy; and (3) delay of reconstruction by performance of a cervical esophagostomy and abdominal gastrostomy. The first two alternatives permit primary reconstruction but entail either an anastomosis of proximal esophageal pouch to a widely devascularized distal esophagus, or to the stomach, which, by virtue of its presence within the thorax, imposes the disadvantages of gastric distention and regurgitation. The latter method of creation of skin stomas has necessitated prolonged and complicated later reconstructive procedures.

Recent experience here and elsewhere with intrathoracic colon transplantation following resection for esophageal carcinoma led to its consideration for late reconstruction in cases of congenital esophageal atresia. The authors were unable to find any report of experience with this procedure for bridging the defect of esophageal atresia.

Theoretic and practical considerations indicate that intrathoracic transplantation of the right colon may avoid disadvantages of other types of esophageal reconstruction for congenital atresia of the esophagus in a child.

1. A one-stage reconstruction may be accomplished by laparotomy without formal thoracotomy. The right colon may be mobilized and pulled through the anterior mediastinum via a substernal tunnel dissected without actually opening the chest wall. Immediate anastomosis in the neck and to the stomach may then be performed through separate cervical and abdominal incisions. The chief disadvantages of a one-stage procedure appear to lie in the danger associated with the five different suture lines necessary to this operation, as well as the possibility of contamination of the mediastinum. The development of antibiotic regimens and better methods of preparing the colon for anastomosis probably obviate most of this. That the entire procedure can be carried out within a reasonable time is evidenced by the 4-hour operating time in these cases, which included time used to make photographic records.

2. The blood supply should be adequate and may be tested prior to division of any vessels by placing vascular clamps on the right colic vessels. In almost every instance the collateral circulation through the marginal arteries should be sufficient.

3. That the right colon will be long enough is attested by extensive clinical and experimental data and by experience in the autopsy room where, in each instance, a sufficient length of right colon could be developed to bridge the distance between the neck and the stomach.

4. The incidence of peptic ulceration should be lower than when the stomach, skin tubes, or jejunum is used.

5. The incidence of fistula formation at the site of anastomosis should be no higher than with other transplantation, particularly since this is probably related to the inadequate blood supply of the other types of anastomosis.

6. The procedure does not by pass the stomach as does the jejunal transplantation.

7. Intrathoracic reconstruction is better than subcutaneous placement, for psychologic reasons if for no others.

Possible disadvantages include stasis within the transplanted colon, compression of the stomach by the middle colic vessels passing over it, and stenosis at the anastomotic lines. In the 2 cases reported, lipiodol x-ray examinations have indicated that the transplanted colon empties slowly. Regurgitation has occurred, however, only when oral feeding has been rapid. If compression of the duodenum or pylorus proves a real disadvantage, it should be possible to bring up the vessels and colon posterior to the stomach through the gastrohepatic ligament and thus avoid this compression.

Two successful cases of intrathoracic transplantation of the right colon to reconstruct esophageal atresia are reported. —*Alan L. Dorian, M.D.*

Malignant Mediastinal Teratoma Simulating Cardiovascular Disease. Wesley Fry, Chester L. Klein, and Harry C. Barton. *Dis. Chest*, 1955, 27: 537.

Careful evaluation of physical signs and the proper interpretation of abnormal cardiac shadows are necessary to avoid diagnostic error in the recognition of mediastinal teratoma. In the case presented, a tentative diagnosis of cardiac disease delayed operative interference, during which time the teratoma assumed malignant metastatic characteristics. The principal findings were cardiac conditions consisting of precordial pain with radiation to the left arm, a grade III systolic murmur along the left side of the sternum, and a mediastinal mass which is called an "abnormal cardiac shadow." Almost 2 months were spent in conservative medical treatment, during which several electrocardiograms were normal and the angiocardiogram was inconclusive.

At operation a trigeminal malignant infiltrative teratoma was removed. The murmur proved to be due to pressure of the tumor on the pulmonary artery and disappeared after removal of the growth. Six weeks later the tumor recurred, metastases were demonstrated, and the patient died.

In the differentiation of mediastinal tumors from heart lesions, cardiac catheterization, angiocardiography, and tomography are recommended. For the separation of tumor shadows from heart shadows, pneumothorax and cardiac fluoroscopy are of value. If the diagnosis is uncertain, thoracotomy should be done promptly. —*B. G. P. Shafiroff, M.D.*

Gastric Cysts in the Mediastinum (Mediastinale gastrogene Cyste). W. Finsterbusch and H. Stolzer. *Thoraxchirurgie*, 1955, 2: 469.

Mediastinal gastric cysts are among the congenital malformations which may demand corrective surgery within the first few weeks of life. Congenital cysts and tumors of the mediastinum are rare, and only a small percentage of these are gastric cysts. The authors found only 45 in the literature. They describe an additional case in detail.

Theories of origin previously recorded include persisting omphalomesenteric duct remnants, isolation of diverticula of the fore-gut at the site of origin of the lung buds or elsewhere, esophageal diverticula with islands of gastric mucosa, and failure of union of all the lumina in canalization after the epithelial plug stage. The number of malformations of the vertebral column, especially clefts in the vertebral bodies, associated with intrathoracic gastric cysts is striking. The authors' patient at age 14 months exhibited a midsagittal cleft in the vertebral bodies from the seventh cervical to the fourth thoracic. The second thoracic vertebra had a horizontal cleft in addition. The thoracic third and fourth intervertebral discs were narrowed, the fourth thoracic vertebra was flattened anteriorly, and there was a spina bifida of the first sacral vertebra. The authors do not consider these vertebral malformations to be coincidentally related to the gastric cysts. They are more often intimately connected to the vertebrae than to the esophagus. It is postulated that there may be a failure of separation of the notochord and entoderm of the foregut, which normally takes place very early in embryonic life. The later fusion of paired sclerotomes to form the vertebral bodies would then be defective and result in the sagittal cleft. The transverse cleft as displayed in the reported patient would come about from delayed fusion of the caudal and cranial halves of adjacent sclerotomes, which normally occurs at the end of the first embryonic month. During growth of the embryo and relative caudal displacement of the foregut, the abnormally fixed portion would be detached. Such situations as two gastric cysts, one in the spinal canal and one in the thorax, separated by a malformed vertebral body, as reported in one patient, seem especially well accounted for by this theory of development.

Symptoms from gastric cysts usually manifest themselves early. The cyst fluid has been shown to contain both hydrochloric acid and a proteolytic enzyme, perhaps secreted under hormonal control. Early symptoms depend on the degree of pressure on the adjacent organs: cough, dyspnea, cyanosis, pain, dysphagia, vomiting. Repeated pneumonias follow bronchial compression. Peptic ulceration and perforation into a bronchus are usually followed by fatal hemorrhage. Most of these cysts extend into the right hemithorax as broad-based projections from the middle mediastinum. Only a small percentage extend into the left hemithorax, as did that in the authors' patient. The cysts are usually single and unilocular. They are generally less than 4 cm. in diameter, although they may become so large as to fill the entire hemithorax. The cyst wall, 1 to 5 mm. thick, is lined by folded gastric mucosa which, almost without exception, resembles that of the fundus and is surrounded by one to two layers of smooth muscle. The differential diagnosis is difficult, and diagnostic aspiration is contraindicated. Surgical removal by transpleural approach is the treatment of choice. —*Elmer V. Dahl, M.D.*

MISCELLANEOUS

Myasthenia Gravis Developing Acutely After Partial Removal of a Thymoma. John H. Fisher and Charles G. Child, III. *N. England J. M.*, 1955, 252: 891.

In the majority of cases in which myasthenia gravis has been associated with thymoma, the signs and

symptoms of muscular weakness had existed from months to years before discovery of the tumor. In a few cases, the tumor was known to exist before the myasthenic difficulties appeared. Although the appearance of myasthenia is usually gradual, it is well recognized that on occasion its symptoms may appear suddenly. The authors report the case of a patient whose first signs and symptoms of myasthenia gravis immediately followed the removal of a large thymoma.

The patient was a 51-year-old male who was admitted to the hospital with a four-week history of severe orthopnea and ankle edema. Four years prior to admission he noted the onset of a productive cough and 2½ years prior to admission, work-up revealed a mediastinal mass and minimal bronchiectasis. He became progressively more short of breath and then was admitted with severe orthopnea and ankle edema. An x-ray of the chest revealed a lobulated tumor mass in the anterior mediastinum, much larger than on the films taken 2½ years previously. There was a right pleural effusion; cytologic examination of the cells in the effusion was consistent with a malignant tumor.

At operation the mass was approached through an incision in both fourth intercostal spaces, the sternum being divided transversely. Implantations were found in the right thoracic cavity. The histopathologic diagnosis was thymoma and although the slides showed no histologic evidence of malignancy, the lesion was considered to be a malignant thymoma because of its aggressive behavior.

As soon as the chest was closed there was a sudden marked difficulty in respiratory exchange. One milligram of neostigmine was given and the respiratory difficulties improved appreciably. Several hours later a definite lid lag was noted which disappeared when 0.5 mgm. of neostigmine was given. The next day he showed persistent respiratory distress and extreme weakness; 0.5 mgm. of neostigmine was then given hypodermically every 8 hours with marked improvement. He became stronger and during the next 8 days walked around his room without difficulty. The neostigmine was discontinued on the eighth postoperative day, and he did well for 4 days without neostigmine when suddenly severe respiratory depression developed and he became cyanotic and comatose. Neostigmine was restarted, 1 mgm. every 4 hours, with dramatic but brief improvement, for the patient died on the fourteenth postoperative day, presumably from extensive cerebral damage due to prolonged hypoxia. Permission for post-mortem examination was refused.

At the time of surgery the size and position of the tumor led to the impression that the patient's dyspnea was due either to the size of the tumor or to its pressure on the heart and contiguous structures. Signs and symptoms of acute myasthenia gravis developed almost before the operation was completed. During operation the patient received 10.5 mgm. of curare. Curare is dangerous for a patient with myasthenia gravis. He also received demerol and cyclopropane which, also, may have contributed to the precipitation of the myasthenic crisis.

This case report emphasizes the necessity for a few precautions when a patient suspected of having a thymoma must be operated upon. Such a patient should receive neostigmine for several days before the operation and not be taken off of it until late in the postoperative period. Curare should not be used during the operation. —*Robert Paradny, M.D.*

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Benign Heterotopic Tumors of the Gastric Mucosa (Tumeurs bénignes hétérotopiques de la paroi gastrique). GUY ALBOT, MONIQUE PARTURIER-ALBOT, CHRISTIAN NEZELOF, and ANDRÉ-G. PREVOST. *Acta gastroenter. belg.*, 1954, 14: 840.

THE AUTHORS review the literature on aberrant pancreatic tissue and report 3 cases, also 3 cases of adenoma of Brunner's glands, and 2 cases of Lieberkuehn's tumors. They stress the polymorphic clinical pictures and difficulties of accurate diagnosis. They consider the first 2 groups which were heterotopic, and the last group which was heteroplastic.

Clinically, they found hemorrhage to be common. They note that pyloric stenosis is more often associated with aberrant pancreatic tissue than with other tumors. Ulceration is reported common to all, but was not found in their 3 cases of aberrant pancreas. They agree with the general view that malignant change is rare. They find no consistent roentgenologic picture. They point out that surgical exploration is often insufficient in itself for diagnosis, and that gastrectomy may have to be performed to make certain of it.

—Roger H. L. Wilson, M.D.

Gastric Tumors Other Than Carcinoma; Report of Unusual Cases. SAMUEL F. MARSHALL. *Surg. Clin. N. America*, 1955, 35: 693.

FROM 93 TO 95 PER CENT of all tumors of the stomach are carcinomas and the other 5 to 8 per cent include a diverse group. The experience at the Lahey Clinic, Boston, for the past 25 years is tabulated.

CLASSIFICATION AND INCIDENCE OF 1,700 GASTRIC TUMORS AT THE LAHEY CLINIC

	No. of cases	*Per cent*
Carcinomas	1567	92.2
Sarcomas		
Lymphoid tumors 35		
Leiomyosarcomas 16	51	3.0
Benign tumors		
Leiomyomas 28		
Single polyps 31		
Multiple polyps 6		
Lipomas 2		
Miscellaneous 3		
Aberrant pancreas 12	82	4.8
Total	1700	

The sarcomas of the stomach are principally those of the malignant lymphoma group and leiomyosarcoma. These are of considerable interest in that their prognosis is considerably better than that of carcinoma of the stomach. The lymphoma group are quite sensitive to x-ray therapy while the leiomyosarcomas are unaffected by roentgentherapy. The common benign tumors of the stomach are leiomyomas and polyps, both single and multiple. All of these lesions should be excised in order to make a certain diagnosis.

—Robert W. Williams, M.D.

Gastrectomy in Acute Gastroduodenal Perforation; Analysis of 112 Cases. DENTON A. COOLEY, GEORGE L. JORDAN, LEROY BROCKMAN, and MICHAEL E. DEBAKEY. *Ann. Surg.*, 1955, 141: 840.

AN ANALYSIS of 199 cases of acute gastroduodenal perforation is presented. The patients were hospitalized during the 4 year period ending October, 1954. On the basis of the change in the policy of treatment that occurred in January, 1952, from simple closure to gastrectomy as the procedure of choice, the cases were divided into 2 groups. In the earlier group, gastrectomy was done in only 22 per cent of the cases; in the later group, it was done in 74 per cent.

Neither the total nor the operative mortality was appreciably affected by the change in treatment policy. In the earlier period, the operative mortality was 4.5 per cent and the total mortality was 7.3 per cent. In the later period, the operative mortality was 6.9 per cent, and the total mortality was 7.6 per cent.

Comparison of the mortality rates among the groups treated by simple closure and gastrectomy, however, reveal lower incidence in the latter. For 112 patients treated by gastrectomy, the total mortality was 4.5 per cent; for 70 patients treated by simple closure, the mortality rate was 8.6 per cent.

The study suggests, therefore, that gastrectomy, when properly applied, may be done with a sufficiently low mortality and morbidity to justify its use as primary treatment in acute gastroduodenal perforation. This fact, as well as the relatively high recurrence rate following simple closure of the ulcer, further supports the advocacy of gastric resection in all perforations of gastric ulcer and in all patients with duodenal perforation who have had previous complications or a long history of ulcer disease.

—Samuel Kahn, M.D.

A Critical Evaluation of Radical Subtotal Gastric Resection as a Definite Procedure for Antral Gastric Carcinoma. HENRY W. MAYO, JR., JENNINGS K. OWENS, and MILTON WEINBERG. *Ann. Surg.*, 1955, 141: 830.

IN A SERIES of 194 cases with a diagnosis of gastric carcinoma, 53 resections of the stomach were performed. Of these 53 operations, 22 were classified as "curative" resections, and 31 as "palliative" procedures. The over-all 5 year survival rate in 129 cases diagnosed 5 or more years before the study was undertaken was 8 per cent. Of 15 patients in whom resection was done in the absence of demonstrable lymph node involvement, 10 survived 5 years or more; among these, was one patient with contiguous liver involvement which was also removed. There were no 5 year survivors in 11 cases with demonstrable lymph node involvement.

Radical subtotal gastric resection as now employed is inadequate to save those patients with antral carcinoma which has already metastasized to the regional lymph nodes. Total gastrectomy appears to have little to offer for these patients. Consequently, the procedure originally proposed by Harvey, which combines

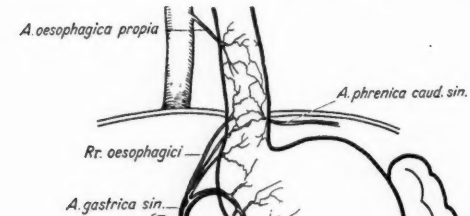


FIG. 1 (Holle, Heinrich). Vascular supply of the fundus region of the cardia.

pancreaticoduodenectomy with radical subtotal resection, is suggested as a possible approach in an effort to increase the salvage rate in cases of antral carcinoma with lymph node metastases.

—*Samuel Kahn, M.D.*

The Significance of the Prepyloric Gastric Stump and Its Preservation by a Subdiaphragmatic Fundectomy (Die Bedeutung des praepylorischen Magenrestes und seine Erhaltung durch eine subdiaphragmatische Fundektomie). F. HOLLE and G. HEINRICH. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 270.

TOTAL GASTRECTOMY is a mutilating operation to be recommended only in particular cases, and is likely to result in enterohepatic disturbances of the protein metabolism, disturbances of iron resorption, changes in the blood picture even to the extent of genuine agastric pernicious anemia, and serious proliferation of bacteria in the biliary tract with consequent degeneration of the liver cells.

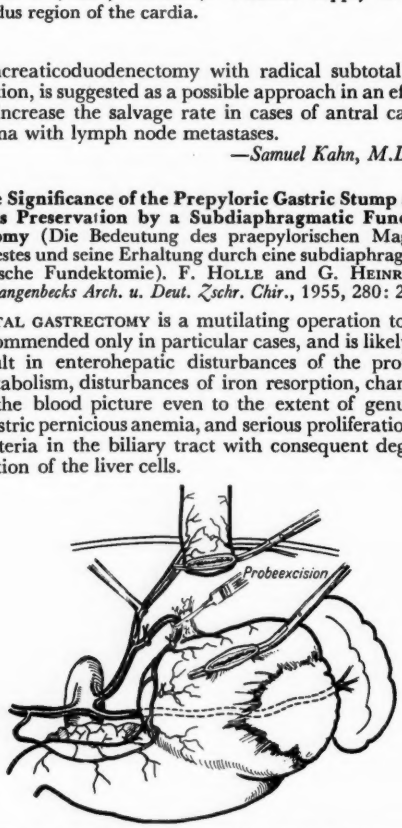


FIG. 2. Fundectomy: the abdominal esophagus is divided and the fundus turned forward. The left gastric artery is ligated distal to the insertion of its esophageal branches. The splenic artery must always be preserved.

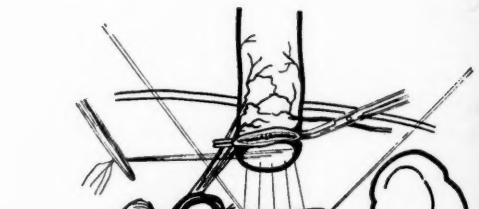


FIG. 3. The fundus has been resected and closed. An esophagogastric anastomosis is performed at the posterior or anterior wall of the gastric stump.

Very favorable results have been obtained by subdiaphragmatic fundectomy with restoration of the normal transduodenal passage. This operation likewise ensures a satisfactory retention of food in the residual stomach, which produces adequate mucoproteins, so that this operation offers more favorable conditions for iron and protein metabolism.

A special technique for subdiaphragmatic fundectomy is described as first performed on experimental animals (dogs) and later on human subjects. Following upper median laparotomy through an incision extending from the umbilicus to the xiphoid (in obese patients and in patients with a steep thorax), the incision may be made on the left side following the incurvation of the cartilaginous costal arch, according to Kirschner, and on determination of the site of the tumor, as shown by displacement of the cardia, there will be a good exposure of the abdominal esophagus which is caught with two holding sutures. The left index finger is used to dissect a path around the abdominal esophagus, the esophageal branches of the left gastric artery including the vagus fibers and lymph cords, being retracted and carefully preserved.

A soft esophagus clamp is applied cranially, a strong rectangular clamp is applied caudally, and the abdominal esophagus is then divided at its site of entrance into the stomach. The fundus of the stomach is then exteriorized to give a good exposure of the left gastric artery and the splenic artery. All the smaller branches of the left gastric artery passing into the fundus are ligated close to the gastric wall, whereas the artery itself is ligated distal to the insertion of the ascending esophageal branches.

Exploration and palpatory findings will determine whether fundectomy or gastrectomy is indicated. If fundectomy is indicated, the gastric fundus is then clamped and resected. The resection can be accomplished more conveniently with a Petz suture apparatus. In this manner the proximal third to half of the stomach can be removed without dangerous tension in anastomoses between the esophageal stump and the

rest of the stomach. Following blind closure of the gastric stump, a small anastomosis is performed between the abdominal esophageal stump and the anterior or posterior side of the gastric stump. A nasal tube is introduced and left in situ for the next 2 days, for removal of secretion that is increased temporarily. Pyloromyotomy is not imperative and in some instances may prove disadvantageous by reducing the retention of food in the gastric stump. It is astonishing how quickly the remaining portion of the stomach adjusts to the new conditions and begins to take on its normal anatomic shape.

Subdiaphragmatic fundectomy is indicated in circumscribed malignant tumors of the greater curvature in the fundus. Three cases are described in detail, and although sufficient time has not elapsed for final evaluation, it appears that the results will be as favorable as in animal experiments. In the latter event, fundectomy might also prove of value for resection of highly situated gastric ulcers. —*Edith Schanche Moore*

Intestinal Obstruction Resulting from Malrotation of the Intestine. E. MERIDITH ALDRICH, C. BRUCE MORTON, II, and JAMES P. BAKER. *Ann. Surg.*, 1955, 141: 765.

INTESTINAL OBSTRUCTION secondary to abnormalities of intestinal rotation is not infrequent in infancy and childhood, and should always be considered among the etiological factors. In adults, obstruction on the same basis is rare.

The clinical picture is that of a high obstruction, with vomiting of the upper gastrointestinal contents. In the majority of cases, symptoms begin shortly after birth, and are persistent. In some cases, the symptoms are intermittent in character. The obstruction is usually incomplete, and the passage of meconium differentiates it from complete atresia.

Operative treatment should be undertaken as soon as a tentative diagnosis is made and when correction of fluid and electrolyte balance is accomplished. Two objectives must be attained in all cases—reduction of a volvulus, if it exists, and relief of the obstruction.

Fourteen cases of malrotation are reported. In 11, there was arrest of normal rotation, in 2 there was nonrotation, and in one there was reversed rotation. Thirteen of this group of patients were operated upon; 7 survived.

Awareness of the possibility of malrotation as a cause of obstruction will more often result in correct preoperative diagnosis, prompt treatment, and lower mortality. —*Samuel Kahn, M.D.*

Discussion on Toxic and Nutritional Disturbances in the Small Intestine Associated with Surgery of the Gastrointestinal Tract. JOHN BRUCE, L. J. WITTS, IAN AIRD, M. R. EWING, and Others. *Proc. R. Soc. M.*, Lond., 1955, 48: 245.

THIS REPORT deals with a discussion concerning serious structural and functional derangements in the small intestine that may follow operations for disease elsewhere, and especially in the abdomen. The causes of many of these disturbances are relatively obscure; the circumstances under which they may arise can be appreciated, but the mechanisms which evoke them are obscure. To provide a basis for discussion the following outline is presented:

A. Disorders of motility

1. Small bowel obstruction caused by paralysis, toxicity, and mucosal edema of the jejunum after gastrectomy

2. Exaggerated motility after gastric operations and postoperative necrosis of the intestinal mucous membrane

3. Disorders of the digestion and absorption following massive resections of the gut, blind loop syndromes, chronic intestinal injury, and losses of digestive juices from biliary, pancreatic, or intestinal fistulas.

Paralytic (adynamic) ileus in the absence of peritonitis is adequately treated by gastrointestinal suction drainage. The period of quiescence in toxic peritonitic ileus is greatly prolonged if the proteins, electrolytes, and potassium are low. The adhesions produced by the peritonitis may organize sufficiently to distort and obstruct the intestine and require surgical relief.

Postgastrectomy edema of the jejunum is considered to be an edema not of the stoma alone but of a substantial length of the jejunum. In 2 instances it was necessary to remove by suction the whole oral intake of the patient for 3 and 4, respectively, weeks before a patent jejunal passage was recovered.

Mild and transient diarrhea is not uncommon a few days after gastrectomy; it is usually ascribed to jejunal irritation by ingested organisms which escape destruction as a consequence of diminished acidity of the gastric juice.

Reduced gastric acidity, with consequent bacterial proliferation in the upper jejunum, is also suspect in diarrhea following vagotomy. In about 20 per cent of the patients it is severe and may run a protracted course or recur repeatedly after intervals of freedom. Other factors that may contribute to its production are gastric retention and a reduced flow of pancreatic juice.

The clinical and pathological features of postoperative necrosis of the intestinal mucous membrane (acute pseudomembranous or necrotizing enteritis) are characteristic. A choleralike diarrhea begins abruptly, or in cases undergoing suction, the aspirate becomes foul and alarmingly excessive, and collapse and peripheral circulatory failure follow so rapidly that death may occur in 48 to 72 hours.

The striking pathologic change is a diffuse or patchy necrosis of the mucous membrane of the jejunum, ileum, or colon, or all three; the necrotic mucosa may be shed or may form a pseudomembrane over the deeper layers of the bowel wall. Grossly and microscopically there is a striking absence of recognized evidence of infection or inflammation, or of obstruction of the main intestinal vessels.

The causes for the necrosis suggested are intensive vasoconstriction of the intestinal vessels from shock, severe toxic bacterial reaction, and antibiotic therapy. However, postoperative necrosis was well known before the antibiotic era. The intensity of the accompanying collapse is related to the enormous loss of fluid, electrolytes, and protein from the bowel, and adequate and rapid replacement of these substances should improve the prognosis. Regeneration of the bowel lining is possible for in extreme cases islands of mucous membrane persist at the bottom of the intes-

tinal glands, and, despite the extensive destruction, cells may be discovered in mitotic division.

Postoperative malabsorption states are among the most distressing of the sequelae of gastrointestinal surgery. Certain of the therapeutic problems involved, such as the maintenance of fluid and the electrolyte and nutritional status in the presence of intestinal and other fistulas, are familiar and accepted. The role of the defective absorption of iron and vitamins following extensive intestinal and gastric operations is discussed. —*John H. Mohardt, M.D.*

Hemorrhage as a Complication of Diverticulitis. RUDOLF J. NOER. *Ann. Surg.*, 1955, 141: 674.

HEMORRHAGE has not been generally accepted as one of the major complications of diverticular disease of the colon and, traditionally, bleeding has been considered rare. More recently, however, there has been increasing recognition that bleeding is a common occurrence and can actually be manifested as being sudden and profuse or even exsanguinating. The incidence of bleeding given by most authors ranges between 10 and 30 per cent. The author's interest in the problem stems from 2 cases of exsanguinating rectal hemorrhage due to diverticular disease which, in turn, prompted a study of the records of patients admitted to the Louisville (Kentucky) General Hospital with a diagnosis of diverticulosis and/or diverticulitis from January, 1949 to June 30, 1954. Sixty-eight patients were admitted and 20 of these had bleeding as either the presenting or a major symptom. Six of the 20 patients were operated upon and 3 died. The 3 who died were operated upon in emergency, while 3 other patients with a chief complaint of bleeding from the bowel, with free intervals, recovery, and freedom from bleeding thereafter, were treated by elective resection The hazard of operation in an acutely bleeding patient of this type is emphasized.

It is difficult to locate the actual source of the hemorrhage in diverticula of the colon, but a study of the colonic vascular distribution in these patients sheds some light upon the relationships which might be expected to play a part in this complication. Human colon specimens removed at autopsy were injected with liquid latex and then fixed to demonstrate the large number of blood vessels in the walls of the diverticula. The concentration of vascularity in these areas, as demonstrated in the injected specimens, makes it not too difficult to imagine that severe hemorrhage could result from erosion of these vessels by an ulcerative process due to either local trauma or inflammation.

The author feels that the old dictum, "if it bleeds, it must be carcinoma," should be abandoned, for it appears that rectal bleeding is of little value in a differential diagnosis between colonic cancer and diverticular disease; it must be recognized as a part of the picture of colonic diverticulitis. Other workers refer to bleeding from diverticula which do not show evidence of any inflammatory process by inspection of the involved gut or by x-ray examination. It is difficult to imagine how bleeding begins in diverticulosis unless there is either mechanical erosion of the vessels or an inflammatory process with necrosis of the mucosal lining. The author's premise is that bleeding must usually be associated only with some degree of diverticulitis, whether severe or mild in degree. Hemorrhage is one of the hazards of diverticular disease that can be eliminated by early resection in properly selected cases of diverticulitis. —*James H. Holman, M.D.*

Duodenal Ulcer As an Occasional Etiologic Factor in Obstructive Jaundice. W. J. SNAPE. *Ann. Int. M.*, 1955, 42: 1001.

DESPITE THE CLOSE ANATOMIC RELATIONSHIP between the extrahepatic biliary system and the duodenum, jaundice coexisting with a duodenal ulcer is infrequently reported in the literature. In the early reports of collected cases, the associated biliary obstruction was usually periampullary in location. More recent reports give the impression that the obstruction usually occurs at some more proximal point. The author reports on 6 cases observed by him in a period of 3 years, half of which were proved at exploration.

There are three possible levels of obstruction of the common bile duct by duodenal ulcer. The least common site would appear to be at the biliary papilla. There was one such case in this series. There were 3 examples of obstruction resulting from pancreatic inflammation and edema associated with a posterior penetrating ulcer in the superior portion of the duodenum. Finally, the more proximal portion of the common duct may become obstructed by involvement of the gastrohepatic ligament by a deeply penetrating or perforating ulcer.

The elevated alkaline phosphatase, the prompt response to vitamin K, the absence of urinary urobilinogen, and the prompt recession of jaundice with ulcer therapy, along with liver biopsy tended to confirm the presence of obstructive jaundice in these cases. The elevated thymol turbidity, leukocytosis, and fever would have to be explained on the basis of a coexistent cholangitis. —*John L. Lindquist, M.D.*

Antroduodenectomy and X-Ray Irradiation in the Treatment of Duodenal Ulcer; a Progress Report. GRAYTON BROWN and IAN J. WOOD. *Austral. N. Zealand J. Surg.*, 1955, 24: 260.

THE AUTHORS believe that conservative therapy is preferable to radical surgery in the treatment of duodenal ulcer. The therapy they suggest is antroduodenectomy followed by x-ray irradiation. The surgical technique of antroduodenectomy with gastroduodenal anastomosis is described, particular attention being paid to the selection of suitable cases for carrying out this procedure, and to the necessity of obtaining healing of the suture line by primary intention.

The authors believe that antroduodenectomy should be confined to patients with the ulcer situated in the proximal part of the duodenum. This includes the majority of patients requiring surgery.

The series reported consisted of 81 patients, 67 males and 14 females. The average age was 52. The indications for surgery were pain, hemorrhage, and obstruction. Gastroscopy was done preoperatively in 34 cases, and was helpful in ruling out a preantral lesion.

When the ulcer was considered too large or was unsuitably placed for resection, the duodenum was closed proximally to the ulcer and a Billroth II opera-

tion was performed. No attempt was made to resect all the ulcers. There were 2 postoperative deaths, both in patients who had large ulcers extending to the junction of the first and second parts of the duodenum.

The patients subjected to antroduodenectomy were divided into two groups, the test group (44 cases) receiving x-ray irradiation to lower the high secretion of acid and pepsin which remained after antroduodenectomy, and the control group (35 cases) receiving no x-ray irradiation. The average time of follow-up in the patients receiving x-ray irradiation was 18 months, and in the patients receiving no x-ray irradiation the average time of follow-up was 12 months. The limited number of patients and the short time of follow-up, did not provide a significant difference between the two groups but the use of x-ray irradiation 2 months after operation is favored by the authors.

—Ely Elliott Lazarus, M.D.

Segmental Colitis; Results of Surgery. JAMES H. MANNING, RICHARD WARREN, and ABDUS SATTAR ADI. *N. England J. M.*, 1955, 252: 850.

THE PRIMARY PURPOSE of this study is to evaluate the efficacy of anastomotic surgery for segmental colitis, that is, operations that by-pass or eliminate the disease without creating a colostomy or ileostomy.

Anastomotic operations were done on 34 patients suffering from segmental colitis. Of these, 24 patients had resections, while 10 had anastomosis without resection. Operation was not performed until failure of conservative management became evident, except in instances in which the possibility of carcinoma could not be excluded. Patients were examined from 1.5 to 17 years after operation, the mean follow-up period being more than 4 years.

Surgery was successful in rendering 19 patients (55.8 per cent) asymptomatic for an average follow-up period of 4.6 years. In one-fourth of these asymptomatic patients, however, x-ray or proctoscopic evidence of mild, persistent or recurrent disease was present. The group of asymptomatic patients included 15 (62.5 per cent) of the 24 with resection and 4 (40 per cent) of the 10 without resection. The over-all arrest rate after surgery was 44.2 per cent (15 patients).

Surgical management is necessary in the majority of cases of segmental colitis. No criteria can be established to predict which patient will have recurrent disease after an anastomotic operation. Such an operation should therefore be attempted before a decision for ileostomy is reached. Unless there is a definite contraindication, resection of the diseased bowel should be accomplished at the same time as the anastomosis or at a planned later date.

—John L. Lindquist, M.D.

Pectenosis and Its Surgical Treatment (Die Pectenosis und ihre chirurgische Behandlung). E. KNIGGE, P. KÖNIG, and W. DICK. *Deut. med. Wschr.*, 1955, 80: 474.

THE AUTHOR described the anatomy of the anal region and its relation to the pecten band (Fig. 1). In pectenosis the patient usually is complaining of constipation. Some authors described the presence of obstruction due to pectenosis. All the other symptoms are related to the original disease such as fissures, hemorrhoids, fistulas, abscesses, or papillitis. Digital and anoscopic examination will prove the diagnosis of pectenosis. Stenosis of the anal canal is typical. Dilatation is unsuccessful. Sometimes the pecten band is palpable and can be distinguished from the subcutaneous portion of the sphincter externus. The pecten band consists of collagenous connected tissue.

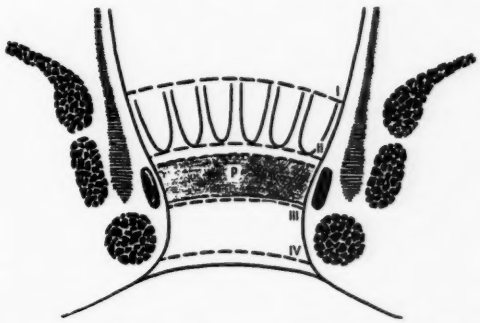


FIG. 1. (Knigge *et al.*). *P*, Localization of pecten band; *I*, linea anorectalis; *II*, linea pectenata (dentata); *III*, linea alba Hiltons; and *IV*, linea anocutanea.

The treatment for pectenosis is pectenotomy, an operation which was first described by Miles in 1919. Usually the pecten band is readily visualized. The author believes to have better postoperative results if the band is not only dissected but if from 0.5 to 1.0 cm. of it is resected.

Pectenotomy is an operation with very small risks, especially as it is usually done under local anesthesia. The postoperative results are striking.

—Frank R. Lichtenheld, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Determination of Pressure in the Portal Circulation by Catheterization of the Hepatic Veins (Die Beurteilung des Druckes im Portalkreislauf durch Lebervenenkatheterisierung). H. KROOK and W. OVERBECK. *Deut. med. Wschr.*, 1955, 80: 437.

A RELIABLE METHOD for measuring the blood pressure in the portal circulation is a prerequisite in determining the proper indications for shunt operations to relieve portal hypertension. Experimental findings justify the assumption that just as pressure conditions in the pulmonary arteries may be determined from pressure conditions in the pulmonary veins, so pressure conditions in the portal system may also register in the venous system. Information might thus be obtained as to whether symptoms of portal hypertension are of intrahepatic or extrahepatic origin. Such a method has been used recently in a large series of patients.

The patient is prepared as for cardiac catheterization. Following local anesthesia and venesection, a Cournand catheter (No. 8 or No. 9) is introduced into the cubital vein, preferably the median basilic vein of the right arm. After passing through the right auricle and inferior vena cava, the catheter is introduced into

a left or right hepatic vein until a peripheral vein is occluded. Best results followed entry of the hepatic vein on the right side. It is important that the tip of the catheter be in a peripheral position so that obstruction at a bifurcation of the veins will not simulate occlusion of a venule and thus falsify results. An attempt was made to push the catheter to the hepatic margin under roentgenographic control in order to insure definite occlusion of a venule. The pressure in the occluded venule was first recorded and then, with simultaneous registration of pressure, the catheter was withdrawn until the venule was no longer occluded. Thereupon, pressure determinations were made in the free hepatic vein, vena cava inferior, and the right auricle. The Hansen-Warburg apparatus was used for recording pressure.

The series of 72 cases included 29 patients with no clinical evidence of disease of the liver, 33 cases of portal hypertension of intrahepatic origin, and 10 patients with congestion of the liver due to a constrictive pericarditis or decompensated valvular defect. The average pressure under normal conditions was 5.6 mm. Hg $\pm$ 1.09; in cirrhosis of the liver, 20.9 mm. Hg $\pm$ 4.48; and in venous congestions 16.6 mm. Hg $\pm$ 5.66. The pressure in the free hepatic vein showed characteristic deviations. In cirrhosis of the liver, the average level was 6.6. mm. Hg $\pm$ 1.62, and in venous congestions, 16.7 mm. Hg $\pm$ 5.74 as compared with 3.8 mm. Hg $\pm$ 0.81 under normal conditions. The average difference between pressure in the occluded venule and in the free vein was normally 1.9 mm. Hg $\pm$ 0.13, and in cirrhosis 14.1 mm. Hg $\pm$ 3.29. In congestions of the greater circulation, no differences could be shown.

This method is also of value in the diagnosis of extrahepatic portal hypertension, when clinical symptoms of hypertension appear with normal pressure in the occluded venule. —*Edith Schanche Moore*

Portal Hypertension. Cornelius E. Sedgwick and Charles M. Parrish. *Surg. Clin. N. America*, 1955, 35: 667.

Portal hypertension is of interest to the surgeon because of the extremely bad prognosis of patients with esophageal bleeding secondary to portal hypertension. Approximately 80 per cent of the patients with esophageal varices have them on the basis of Laennec's cirrhosis and the other 20 per cent because of some extrahepatic obstruction.

The indications for surgical intervention are cirrhotics who have bled from esophageal varices and patients with secondary hypersplenism who have esophageal varices. Chronic ascites is a sign of advanced liver disease and makes the outlook worse.

Venovenous anastomoses are much to be preferred to such procedures as ligation of one or more branches of the celiac axis, resection of portions of the stomach, splenectomy, or direct ligation of the esophageal varices. The choice of a splenorenal or portacaval type of anastomosis is frequently dictated by the pathologic process. Splenoportography is of considerable aid in determining the best type of procedure in a given patient. This is done immediately prior to operation. A combined abdominothoracic incision is recommended for either portacaval or splenorenal operation. End-to-side anastomosis of the portal vein to the inferior vena cava is done with interrupted everted nonabsorbable suture. In doing a splenorenal anastomosis it is important not to remove the spleen until a sufficient length of splenic vein is well mobilized. The renal vein is occluded with heavy silk during the time the anastomosis is actually performed and this too is done with interrupted everted silk sutures.

Postoperative care is aimed at rapid mobilization and a return to a good diet. Anticoagulants are not used. A broad spectrum antibiotic is employed routinely for the first few days postoperatively.

—*Robert W. Williams, M.D.*

Surgical Treatment of Portal Hypertension from the Standpoint of Hemorrhage from Varicosities (Zur chirurgischen Behandlung des Pfortaderhochdruckes unter dem Gesichtspunkt der Varizenblutung). A. Gütgemann, G. Hennrich, and W. Nagel. *Deut. med. Wschr.*, 1955, 80: 599.

Statistics show that 50 per cent of the patients with liver cirrhosis who develop esophageal varicosities die from hemorrhage within a year.

In children portal hypertension and varices may be the sequel of extrahepatic thrombosis or constriction, especially in the area of the splenic vein, of malformation of some blood vessels, or of an inflammatory lymph tumor.

Various procedures on the esophagus do not decompress the veins in the region of the cardia and fundus of the stomach. Talma's operation is not able to establish an adequate collateral circulation. If the obstacle to the venous reflux lies in the region of the splenic vein, splenectomy should be considered, but its value concerning prevention of further bleeding is problematic. Opinions are divided as to the effectiveness of ligation of the splenic, gastric, or celiac artery. Sengstaken-Blakemore's tube produces a direct compression of the bleeding esophageal veins, but the period during which it may be left in situ without the danger of a decubital ulcer may be too short to accomplish a perfect hemostasis. An intraesophageal or intragastric ligation of varices may have to be performed prior to portacaval anastomosis.

A prehepatic obstacle, such as portal thrombosis or stenosis of the splenic vein, may be treated by splenectomy and anastomosis between the splenic and the left renal vein.

Portacaval shunt should not be performed in the presence of hypoalbuminemia, especially if the albumen content of the blood fall below 3 per cent. It is questionable whether portacaval anastomosis can markedly reduce ascites. —*Joseph K. Narat, M.D.*

The Effect of Ligation of the Hepatic Artery on the Development of the Collateral Circulation in the Dog (Effetti della legatura dell'arteria epatica nel cane in rapporto allo sviluppo del circolo collaterale). L. Belli, P. Galli, C. Borelli and G. Monteverde. *Arch. ital. chir.*, 1954, 79: 215.

The authors point out the variations in the anatomy of the arterial supply of the liver in the dog and how it differs from that in the human being. Studies were carried out to see the effects of ligation of the hepatic artery at various points in the dog with and without

the protection of antibiotics. In one group of animals the common hepatic and the gastroduodenal arteries both were ligated. When no antibiotics were used all the controls died, while with antibiotics the animals survived and arteriograms done 30 days later showed the development of collaterals from the phrenic artery and the left gastric artery. When India ink was injected into the aorta most of it was deposited in the right lobe of the liver.

In the second group of animals ligation of the hepatic artery and its terminal branches and of the gastroduodenal artery was carried out. When no antibiotics were used all of the animals died, while those given antibiotics survived. When they were sacrificed, examination of the liver showed passive congestion and then fatty infiltration in the first week and in 3 weeks there were areas of focal necrosis with associated regeneration. Aortograms in these animals showed the following collaterals develop after 5 days: vessels along the lesser omentum, vessels in the periportal and pericholedochal network, and capsular branches of the phrenic artery. India ink injection in these animals failed to show any deposition in the liver. There was also a marked fall in the oxygen content of the hepatic vein blood following hepatic artery ligation, which indicated utilization of the available oxygen in the portal vein. This oxygen content returned to normal in 2 weeks. The authors conclude that it is impossible to tell where areas of focal necrosis will occur following hepatic artery ligation because they think they depend upon the metabolic activity of the various segments of the hepatic lobules at the time of surgery.

This work is well illustrated and the arteriograms are well reproduced. —*Alexander J. Conte, M.D.*

A Method for Determining the Patency of Portacaval and Splenorenal Shunts. JEROME GIUSEFFI and THOMAS LARGEN. *Arch. Surg.*, 1955, 70: 707.

SINCE THE INITIATION of treatment of portal hypertension by decompressive vascular shunts between the portal and systemic venous systems, the efficacy of this form of treatment has been established. The importance of a simple method to determine the status of the anastomosis has long been recognized.

A new method of "trap" venography was used in the laboratory in a series of 30 dogs. Designed primarily to provide a simple method of visualizing both portacaval and splenorenal shunts, it was used in 15 dogs with complete success. It was also used for pelvic venography, hepatography, and demonstration of the vertebral venous pathways in 15 other dogs.

No serious complications developed. The method described, having been adequately studied in the laboratory, now deserves clinical trial. What is required is the development of a suitable catheter.

—*Samuel Kahn, M.D.*

The Gallbladder and the Biliary Tract. RUPERT VAUGHAN HUDSON. *Arch. Middlesex Hosp.*, Lond., 1955, 5: 57.

IN THIS DISCUSSION concerning the gallbladder and the biliary tract diagnostic difficulties arising in a patient with dyspepsia are emphasized. The main difficulty in diagnosis stems from the habit of considering the gallbladder as an isolated structure rather than an organ in intimate anatomical and functional relationship with the biliary tract, pancreas, and liver.

A classification of pain is presented and illustrated by reference to essential facts in the anatomy and physiology of the biliary tract together with case histories and follow-up of patients. The author's classification is as follows: (1) a primary site of pain common to both the gallbladder and the common duct, (2) two types of pain, i.e., pain without colic and pain with colic, (3) referred pain which may be to the "gallbladder area," the "hepatic area," and the "pancreatic area," (4) nondyspeptic patients commonly made aware of stones by violent colic, and (5) two types of dyspepsia, i.e., a true biliary tract dyspepsia and a pseudobiliary tract dyspepsia, the hepatopancreatic syndrome.

For patients with the hepatopancreatic syndrome, the treatment is medical. For the other two groups medical treatment is an essential supplement to preoperative and postoperative treatment.

Dyspepsia accompanied by a pathological change in the biliary tract persists following surgery in 20 to 30 per cent of the patients and stones re-form in the biliary passages in about 10 per cent of the patients. —*John L. Lindquist, M.D.*

An Evaluation of Dilatation of the Sphincter of Oddi. BROCK E. BRUSH, JOSEPH L. PONKA, FRANK DAMAZO, and JOHN WHITCOMB. *Arch. Surg.*, 1955, 70: 766.

DURING THE PERIOD from 1935 to 1952 it was found that dilators had been used in 198 patients in whom the common duct had been opened, and were not used in 230 of such patients at the Henry Ford Hospital. The amount of dilatation performed depended upon the size of the common duct, the ease with which the sphincter dilated, and other findings. It was found that in 13 patients a sphincterotomy was necessary because of a marked undilatable fibrosis. In addition, 2 jaundiced patients had a stricture of the sphincter which responded to dilatation and resulted in relief of the patient's symptoms. The days of hospitalization of choledochotomy patients were about the same in the dilated and nondilated groups, showing that this procedure did not add to the morbidity. It must be remembered that this group of patients frequently had jaundice with severe liver impairment.

The follow-up study showed that 10 patients in whom the sphincter was not dilated were subsequently operated upon and the stones were removed from the common duct. None of the dilated group has required subsequent surgery, and only one has had symptoms which might be referable to the common duct. This patient is still being observed and thought to have biliary colic. The cholangitis and liver impairment usually present in most of these patients were improved postoperatively.

The causes and per cent of mortality in the dilated and nondilated groups were approximately the same. However, 2 patients in the nondilated group were found to have impacted stones which should have been detected and removed. On the basis of these patients, in addition to the 10 other nondilated ones mentioned from whom stones were subsequently removed, the authors justify their thesis that the dilators should be used whenever the common duct is opened.

Dilatation of the sphincter of Oddi by graduated dilators at the time of choledochostomy gives valuable information about the status of the sphincter. Dilatation of the sphincter permits better drainage of the common bile duct and should permit debris and gravel to pass into the duodenum. Thus, the number of residual stones in the duct and liver should be less. When carefully performed dilatation of the sphincter does not add to the morbidity or mortality of the usual choledochostomy procedure. When dilatation of the sphincter is unsatisfactory, the duodenum should be opened and the sphincter dealt with under direct vision. Graduated dilators should be passed through the sphincter of Oddi in every case in which the common bile duct is opened.

This study was initiated in an attempt to evaluate whether any pathological process is present at the sphincter of Oddi and to diminish the persistence of symptoms of biliary tract surgery. The most frequent cause of persistence of symptoms is an incorrect and incomplete diagnosis. Even though the patient may have gallbladder disease, it is very important that he undergo a very thorough evaluation before it is concluded that the gallbladder is his only or chief problem. Of particular interest, has been a number of conditions occurring at the sphincter of Oddi. One of the most persistent causes is fibrosis of the sphincter and this can easily be detected by the use of dilators. In order to do this properly, it is necessary to mobilize the duodenum adequately so that the entire length of the duct can be palpated when passing the sphincter and the ampulla can also be felt.

—LeRoy J. Kleinsasser, M.D.

Surgical Considerations in the Management of Chronic Relapsing Pancreatitis. KENNETH W. WARREN. *Surg. Clin. N. America*, 1955, 35: 785.

THE FACTORS which have influenced the historical development of the surgical treatment of chronic relapsing pancreatitis include: (1) concepts as to the origin of the disease, (2) physiological concepts with respect to the role of pancreatic stimulation in the production of the symptoms, (3) the pathological consequences of progressive pancreatitis, and (4) the results of surgical attempts to control the symptoms without arresting or reversing the course of the morbid process.

Initial attempts in the surgical treatment of chronic pancreatitis were directed primarily at the biliary tract. This association was established from the classical concept that acute pancreatitis was related to reflux of bile into the pancreas by way of a common pancreatobiliary channel and the frequent association between cholelithiasis and the presence of varying degrees of acute or chronic pancreatitis. There is an increasing skepticism with respect to the validity of this theory as the sole or common explanation of pancreatitis. The interruption of various sympathetic and parasympathetic nerve fibers to the upper abdominal viscera was introduced as a surgical procedure in the management of this condition largely because of the severe pain associated with this disease. The physiologic observation that the diversion of gastric chyme and gastric acid from the duodenum diminished the external pancreatic secretion was responsible for the development of other surgical approaches in the treatment of this disease. Destruction of the acinar tissue by deliberate ligation of the major pancreatic ducts has led to still another concept of the surgical management of chronic pancreatitis.

Detailed studies of the pathologic anatomy of chronic relapsing pancreatitis have resulted in a more comprehensive understanding of the requirements for any surgical procedure utilized in the correction of this disorder. The author emphasized that intrapancreatic obstruction, partial or complete, involving one or both of the major pancreatic ducts is the key to the rational approach to the surgical treatment of this condition. It has become increasingly apparent that this obstruction is of major concern in attempts to relieve the symptoms and the pathologic consequences of chronic relapsing pancreatitis.

Cattell and Warren have divided the various procedures which have been recommended in the surgical management of this disease into (1) indirect procedures, which do not involve direct surgical attack upon the pancreas, and (2) direct methods, in which efforts are aimed at the pancreas itself.

Indirect	*Direct*
A. Biliary tract procedures	A. Drainage of cysts
1. Cholecystectomy, choledochostomy	B. Lithotomy
2. Biliary-intestinal anastomosis	C. Anastomosis
3. Sphincterotomy	1. Continuity
B. Gastrointestinal diversion	2. Diversion
1. Gastroenterostomy	D. Transduodenal exploration and dilatation of main pancreatic ducts
2. Pyloric exclusion	E. Resections
3. Gastrectomy	1. Distal pancreatectomy
C. Nerve interruption	a. Distal pancreatectomy with distal pancreatojejunostomy
1. Sympathectomy	2. Pancreatoduodenectomy
a. Thoracolumbar	3. Total pancreatectomy
b. Splanchnicectomy	
2. Vagotomy	

Indirect surgical procedures. Although there is considerable doubt as to the exact relationship between gallstones and chronic pancreatitis, it is none the less true that the two conditions are frequently associated. Diseases of the biliary tract, when present, should be eliminated. There is evidence in the literature to show that improvement or relief of chronic relapsing pancreatitis may follow simple cholecystectomy or choledochostomy in the milder cases. It is well established that partial and sometimes serious stenosis of the distal intrapancreatic portion of the common bile duct may occur as the result of fibrosis and enlargement of the pancreatic head in chronic relapsing pancreatitis. Bowers has been one of the chief advocates of diversionary biliary-intestinal anastomosis. Division of the sphincter of Oddi, as advocated principally by Doubilet and Mulholland, is based on the concept that chronic pancreatitis results from a reflux of bile into the pancreatic ducts and that this reflux is mediated by spasm of the sphincter of Oddi.

Partial or incomplete obstruction of the duodenum which may attend chronic relapsing pancreatitis may be corrected by a diversionary procedure such as gastroenterostomy, pyloric exclusion, or gastrectomy. The latter with a Billroth II restoration has the theoretical advantage of diverting the gastric acid and

chyme from the duodenum. The authors believe that gastrointestinal diversion should be performed only in those instances in which there is some coexistent disease of the stomach and duodenum which in itself warrants diversion. Sympathectomy, bilateral celiac ganglionectomy, and vagotomy are directed only at the severe pain associated with this disease.

Direct surgical procedures. Cystic collections of various sizes within the pancreas and which have been noted in approximately 25 per cent of the patients should be simply drained during acute exacerbation of the disease and particularly if the patient's general condition is poor.

Simple pancreatolithotomy, without other maneuvers to relieve the obstruction, will have a very limited applicability in the management of this condition. Ligation of the pancreatic ducts, which was designed to produce fibrosis and atrophy of the acinar tissue may relieve pain, but only at the expense of functioning glandular structure. The authors state that this procedure should probably not be employed in the light of current knowledge.

In 1946, Cattell proposed anastomosis in continuity of the duct of Wirsung to the upper jejunum for the relief of chronic pancreatitis. This procedure has certain theoretical merit and its efficiency should probably be explored thoroughly. Some authors have advocated resection of the distal portion of the pancreas and anastomosis of the proximal end of the divided duct to the jejunum. Although this is somewhat more radical a procedure than the side-to-side anastomosis, it may have certain theoretical advantages.

The authors have explored the ducts of Wirsung and Santorini transduodenally in a number of cases of chronic pancreatitis and have confirmed the presence of intrapancreatic obstruction in well advanced cases. Frequently this obstruction can be relieved by incising the ostium of the duct as it opens into the duodenum, if the obstruction is at that level, or by removal of stones or dilatation or incision of the fibrous strictures when the obstruction is deeper within the gland.

Because of the inconsistent results obtained by indirect and less radical direct surgical maneuvers in the treatment of chronic pancreatitis, partial or total pancreatectomy has been utilized in a number of clinics. The removal of the distal portion of the gland is distinctly indicated when the pathologic process is confined to that part of the organ. Distal pancreatectomy with anastomosis of the divided duct of Wirsung to the jejunum may prove effective even when the entire gland is involved and when the point of major obstruction is in the head near the major papilla. Pancreatoduodenectomy has been found to be one of the most effective procedures in the management of this disease. It eliminates the point of obstruction which is most frequently in the region of the periampullary portion of the duct. This procedure is, however, a formidable undertaking and should not be embarked upon lightly. If the distal portion of the pancreas is left intact, the divided duct of Wirsung should be anastomosed to the jejunum by precise mucosa-to-mucosa approximation in order to restore the external pancreatic secretion to the intestinal tract. Although total pancreatectomy removes the disease process entirely, the mortality of this operation is such as to discourage the application of this procedure. The physiologic consequences of total pancreatectomy may be quite profound. On rare occasions, however, this procedure may be warranted when all other methods have failed.

It is apparent from a review of all the various surgical procedures which are performed in the treatment of chronic pancreatitis that no single procedure will benefit all the patients in the management of this complex pathologic process. Each case must be individualized both as to the clinical picture presented and the operative procedure which is utilized.

The authors have analyzed a series of 87 patients with chronic relapsing pancreatitis operated upon at the Lahey Clinic in Boston. The outstanding clinical features observed included a history of abdominal pain in every instance. Fifty-six per cent of these patients gave a history of excessive use of alcohol and 48 per cent used narcotics to excess. Weight loss was present in 94 per cent of patients. Diabetes, usually of a mild character, was observed in 38 per cent. Pancreatolithiasis was noted in 41 per cent, pancreatic cysts in 25 per cent, and jaundice in 25 per cent of these patients. The authors emphasize the fact that approximately half of the patients operated upon had pancreatic stones. From their experience this would indicate a far-advanced and long-standing disease process. While the exact number of patients demonstrating partial or complete obstruction of the pancreatic ducts cannot be stated, it is believed that complete obstruction in one or both ducts is usually present in patients with pancreatolithiasis, as well as in many patients without this complication.

—*Harvey N. Lippman, M.D.*

A Study of 7 Cases of Pancreatic Pseudocysts (Estudo sobre 7 casos de pseudo-cisto do pancreas). ALOISIO FERNANDES. *Arq. cirurg. clin.*, S. Paulo, 1954, 17: 257.

THE AUTHOR compiled 368 cases of pancreatic pseudocysts from the medical literature and referred to 20 more cases of cysts of the pancreas previously reported in the Brazilian literature. This provided evidence of the relative infrequency of these lesions and revealed also that pseudocysts are the most commonly encountered type.

In a review of the admissions at one of the surgical clinics of the University of São Paulo, over a 10 year period, 10,107 surgical cases were found, including the 7 cases of pancreatic pseudocysts reported here.

The pseudocysts, as originally defined by Koerte (1911), are liquid collections in the lesser omental sac, resulting from pancreatitis or pancreatic destruction consecutive to mechanical trauma. The limiting wall of connective tissue conspicuously lacks an epithelial lining usually found in true cysts, congenital cysts, retention cysts resulting from obstruction of the pancreatic ducts, and in true neoplastic cysts which form a polycystic mass in the neighborhood of the pancreas.

There is no universal agreement in regard to the development of pseudocysts, but it is generally accepted that either pancreatitis or trauma can produce focal glandular necrosis by acinar destruction and liberation of enzymes. This necrosis allows the pancreatic juice to escape into the lesser omental sac and set off

a process of localized peritonitis with abundant inflammatory exudate and connective tissue proliferation. If the ducts of this necrotic area are incompletely obliterated by scar tissue, a free communication between the ductal lumen and the cystic cavity is created which becomes an avenue of escape for the pancreatic secretions.

Pseudocysts occur mostly in patients more than 40 years of age; they are found equally distributed between the two sexes and show no evidence of racial predominance. The usual presenting complaint is a hard, tense, smooth epigastric mass located above the umbilicus in 95 per cent of the cases. When pain is present, it has the beltlike characteristic of pancreatic pain and is frequently related to the episodes of pancreatitis. X-ray examinations are the most important diagnostic aids to confirm the clinical impression and to exclude gastric tumors, cysts of the mesentery, omentum, and ovary; hydatid cysts of the spleen and liver, and hydronephrotic masses.

The treatment of pseudocysts of the pancreas is essentially surgical and can be divided into three methods: (1) excision, (2) external drainage, and (3) internal drainage.

Since excision is rarely applicable the other procedures are more frequently employed although they are not entirely satisfactory. In cases with pancreatic necrosis marzupialization is preferred with suture of the cystic walls to the skin. Not infrequently, after this procedure the cysts recur or become infected or the patient develops skin erosions, persistent fistulas or nitrogen and electrolyte imbalances. When external drainage is applied by using the gallbladder or the jejunum, biliary stasis or enteric fistulas may follow.

In this series of 7 patients, 2 were treated by partial excision of the cystic wall and direct ligation of the pancreatic duct draining into the cyst. According to Vasconcelos, there is always a pancreatic duct draining pancreatic secretions into the cystic cavity. The identification, ligation, and transfixion of this duct in these 2 cases, associated with the local excision of the cystic wall, decreased the duration of the postoperative drainage and shortened the hospital stay of the 2 patients.

The other 5 patients of this series were treated in different ways. In one case only medical measures were instituted; in another treatment consisted of needle aspiration, with cure. The remaining 3 patients were operated on and surgical drainage was established. Marzupialization was used in 2 of the last cases. The results in all of the patients operated on were satisfactory. —*Néstor S. Martinez, M.D.*

GYNECOLOGY

UTERUS

Arteriography of the Uterine and Adnexal Blood Vessels (Arteriographie der Uterus—und Adnexgefaesse). ULF BORELL. *Geburtsh. & Frauenh.*, 1955, 15: 497.

THE AUTHOR has performed over 500 pelvic arteriographic examinations on women. Under local anesthesia, a polyethylene catheter is introduced into the femoral artery and the tip is passed up into the external iliac artery a few centimeters distal to the aortic bifurcation. From 40 to 50 ml. of umbradil are injected and three roentgenograms are taken—one of these immediately, and two within several seconds. By this method one can follow the course of the tributaries of the uterine artery, occasionally even to its corkscrew intramural branches. In postmenopausal women the artery is greatly narrowed. To outline the ovarian arteries it is necessary to advance the tip of the polyethylene catheter to the level of the second or third lumbar vertebra. The ovarian arteries have a characteristic winding course and are easily discernible. Few complications of the method have occurred.

Arteriography is valuable gynecologically in distinguishing between uterine myoma and ovarian tumor and may aid in the differentiation between a cystic tumor and solid tumor of the ovary. With uterine myoma, the main branches of the uterine artery are frequently distorted; vascular myoma may be easily distinguished. In obstetrical practice, arteriography finds its greatest use in localization of the placenta in cases of placenta praevia, although other methods such as cystography and soft tissue techniques are simpler. In 20 determinations, the author found pelvic arteriography reliable in the diagnosis of ectopic pregnancy. In one case of hydatid mole after incomplete curettage, the author discovered a vessel-rich area with dye-filled spaces.

Experimentally, pelvic arteriography should serve as a means of measuring the caliber of the uterine artery and its derivatives under the influence of the various ovarian hormones. In combination with hysterography, it might help in determining the thickness of the isthmus. This the author was able to do in one case. —*Warren R. Lang, M.D.*

Tuberculous Intrauterine Symphysis; a Characteristic Anatomical, Clinical, and Radiological Syndrome (Symphyse endo-utérine tuberculeuse; un syndrome anatomo-clinique et radiologique caractéristique). A. NETTER, R. MUSSET, A. LAMBERT, Y. SALOMON, and G. MONTBAZET. *Gyn. obst.*, Par., 1955, 54: 19.

UP TO THIS TIME a description of intrauterine symphysis has not been presented in the French or foreign literature. Seven cases, each presented in full and thoroughly discussed, are reported in this article.

The common signs and symptoms of the first 3 cases were as follows: (1) primary amenorrhea, (2) normal sexual development and estrogen response of the genital organs, (3) the uterine cavity examined by hysterometry was not over 40 mm., (4) on hysterography, union of the uterine walls was evident, (5) there was either a history of tuberculous disease or surgery present, and (6) there was no response to cyclic hormonal therapy.

The probability of tuberculosis is based mainly on the antecedents, the fibroadhesive type of peritonitis, the presence of calcifications in the pelvic area, and the cicatricial type of healing in the affected organs.

In addition to the aforementioned signs and symptoms, caseation and tuberculous follicles in the endometrial biopsy were found in the 2 cases reported. Although other authors have presented cases with the same signs and symptoms, none of them, however, has ever interpreted the roentgenological views as uterine symphysis or union. If the union is secondary and appears after puberty, radical surgery is advised; if, however, the amenorrhea is primary and the patient is anxious to menstruate or to conceive, a more conservative treatment may be followed. The intracavitary adhesions can be broken up by dilators, and a hysterotomy, with removal of the adhesions, may be tried. The results, however, are dubious.

—*Robert O. Verheecke, M.D.*

Environmental Factors in Cervical Cancer; An Approach to Its Prevention. ERNEST L. WYNDER. *Brit. M. J.*, 1955, 1: 743.

A STUDY of the role of environmental factors in cervical cancer indicates that differences in age of first coitus and circumcision status, or lack of good penile hygiene can explain variant data concerning the incidence of cervical cancer among different population groups.

There is no statistical evidence that pregnancy rate plays a part in the production of cervical cancer. The data on pregnancy demonstrate the significance of careful statistical analysis in separating the dependent from the independent variables. They clearly emphasize the importance of trained statistical aid in these investigations.

The abstinence period practiced by orthodox Jewish women after the end of menses is not believed to be the basic factor accounting for the low incidence of cervical cancer among Jewish women.

Exogenous factors play a major part in the development of epidermoid cancer.

Universal circumcision may be a practical preventive step, significantly reducing the incidence of cervical cancer. —*Charles Baron, M.D.*

Conservative Treatment of Carcinoma in Situ of the Cervix; a Clinical and Cytopathologic Study. THOMAS C. PEIGHTAL, WALTER W. BRANDES, DAVID B. CRAWFORD, JR., and EVELYN S. DAKIN. *Am. J. Obst.*, 1955, 69: 547.

IN THE AUTHORS' EXPERIENCE with 50 cases of carcinoma in situ of the cervix, 15 patients remained cytologically negative for from 6 months to over 2½ years after having had no treatment other than an extensive cervical biopsy excision. Thirty-four patients had had

hysterectomies (4 with pelvic lymphadenectomies) and 1 patient was treated with x-rays and radium. In 25 cases, extensive excision of the cervix for biopsy had preceded hysterectomy, and in 21 of these no residual disease could be found in the hysterectomy specimen. In the 4 patients with residual disease, cytologic smears continued to be positive after the biopsy procedure and preceding the hysterectomy.

The authors believe that the experience gained from this study indicates that, when desirable, conservative treatment of carcinoma in situ may be carried out, provided that a sufficiently large area of cervical tissue is removed by cone excision or partial amputation, and provided that the case is closely followed by cytologic smear examinations.

—*Ely Elliott Lazarus, M.D.*

Report of 403 Cases of Carcinoma of the Corpus (1935–1949); a Contribution Concerning Staging and Therapy (Bericht Ueber 403 Korpuskarzinome —1935–1949; ein Beitrag zur Frage der Stadieneinteilung und Therapie). H. WIMHOFER, H. ZEITZ, and H. RUNGE. *Geburtsh. & Frauenh.*, 1955, 15: 209.

DURING the period from January 1, 1935 until December 31, 1948 a total of 1,211 cases of cervical carcinoma and 403 cases of corporeal carcinoma were studied at the University Women's Clinic of Heidelberg. This is a ratio of three to one.

Cancer of the body of the uterus is divided into four stages, as in cancer of the cervix uteri. In stage 1, the lesion is limited to the uterine cavity; in stage 2 there is extension into the cervical canal down to the external cervical os; in stage 3 there is (a) unilateral or bilateral parametrial induration and involvement of the vagina down to introitus, and (b) corpus carcinoma with malignant involvement of the ovaries; in stage 4 the condition has spread beyond the confines of the minor pelvis, to the vulva, and there are distant metastases and involvement of the bladder or rectum.

The absolute salvage rates for all cases, grouped according to the various stages, are as follows:

TABLE I.

	Number of patients	*Per cent*	*Five year salvage*	*Per cent*
Stage I	328	81.4	228	69.5
Stage II	23	5.7	9	39.1
Stage III (a)	25	6.2	7	35.7
Stage III (b)	11	2.7	1	9.1
Stage IV	16	4.0	0	0
Total	403	100.0	245	60.8

The absolute salvage rate for the total was 60.8 per cent; thirteen patients were not treated, giving an overall relative salvage rate of 62.8 per cent.

Results grouped according to types of therapy are detailed below:

TABLE II

Method of treatment	*Number of patients*	*Primary mortality*	*Five year salvage*	*Per cent*
Abdominal operation	149	8	101	67.9
Vaginal operation	60	2	43	71.6
		10 (4.8%)	144	68.9±3.2
Radium		8 (4.3%)	101	55.8±3.7
Untreated	13	0	0	0
Total	403	18 (4.5%)	245	60.8±2.4

It is of interest that even ten-year rates are reported, with operative measures yielding a salvage rate of 60 per cent (51 of 84 cases) and treatment with radium yielding a salvage rate of 44 per cent (52 of 117 cases). The absolute rate was 49.8 per cent and the relative rate 51.2 per cent for a ten-year period.

The authors believe that, in general, surgery has the most to offer, although they are not sure that this has been demonstrated statistically since there was a selection of cases, with poor risk patients receiving radium. Treatment should be individualized and adjusted to what seems best for a given patient.

—*Warren R. Lang, M.D.*

Sites of Metastases of Uterine Carcinoma. JOHN H. HOLZAEPFEL and HARRY E. EZELL. *Am. J. Obst.*, 1955, 69: 1027.

THE PROTOCOLS of 15,000 autopsies made in the city of Columbus, Ohio were searched for the 136 cases reported. These were comprised of 22 cases of endometrial carcinoma, 64 treated and 43 nontreated cases of cervical carcinoma, and 6 cases of uterine sarcoma.

Henriksen's classification of lymph nodes is employed. The primary group of nodes consists of the parametrial, paracervical (ureteral), hypogastric, obturator, and external iliac nodes. The secondary group consists of the sacral, common iliac, inguinal, and aortic (periaortic) nodes.

Most of the patients with stages I, II, and III (League of Nations) cervical lesions had died of intercurrent causes. Among the 43 nontreated patients there were no stage I cases. Of stage II cases there were 2. One had paracervical and parametrial node involvement, the other had hypogastric node metastases. All of the 5 stage III cases had primary node involvement. Three had secondary node involvement, and 3 had distant metastases. Of the 36 stage IV cases, 35 had primary nodes, 25 had secondary nodes, and 21 had distant metastases.

Of the 64 treated cases of cervical carcinoma, there were 6 in stage I. None had node involvement. Of 3 stage II cases, primary node involvement was found in 2, with no residual cancer in the third. Both of the stage III cases had primary and secondary node involvement. Of 53 stage IV cases, 43 had primary node involvement, 31 had involvement of the secondary nodes, and 37 had distant metastases. Thus, the primary nodes were involved in 73 per cent of the treated cases and in 95 per cent of the untreated cases. The secondary nodes were involved in 48 per cent of the treated cases and 65 per cent of the nontreated cases. Of the treated group 57.8 per cent had distant metastases, compared with 51 per cent in the nontreated series.

Distant metastases were widespread. The lungs and pleura had the highest incidence—12.5 per cent in the treated cases and 23.2 per cent in the nontreated series.

The endometrial carcinoma series, both treated (13 cases) and nontreated (9 cases), consisted of patients with rather extensive disease. Primary and secondary node involvement, and distant metastases were common. The lungs were involved in one-third of the cases, and the liver in 31.8 per cent.

The 7 cases of sarcoma of the uterus all had primary node involvement and usually widespread distant metastases as well. —*Alan Rubin, M.D.*

EXTERNAL GENITALIA

Partial Colpocleisis; the Le Fort Procedure; Analysis of 100 Cases. HENRY C. FALK and SHERWIN A. KAUFMAN. *Obst. Gyn.*, 1955, 5: 617.

THE LE FORT PROCEDURE is indicated specifically in elderly women with complete procidentia or inversion of the vagina following hysterectomy.

The interesting historical background of this operation is reviewed in detail including various modifications and results as reported by others.

The chief advantages of the Le Fort procedure are rapid performance under local or light general anesthesia, absence of shock, and very little blood loss. These are of particular importance since the patients undergoing the procedure are elderly and not the best operative risks.

The disadvantages of the operation are inaccessibility of the uterus in the event of postmenopausal bleeding (rare), and the preclusion of coitus.

The article presents a detailed analysis of 100 Le Fort procedures using a single, standardized technique, and a follow-up of from 2 to 22 years. The average age of the patients was 64 years.

Preoperatively, the vaginal tissues are put in healthy condition by rest and local estrogens when necessary. Local anesthesia is preferred, supplemented by a minimal amount of gas, particularly toward the end of the procedure.

The standardized operative technique is described in detail, and illustrated in a step-by-step fashion, including the perineorrhaphy, which is considered an essential part of the procedure.

Adequate follow-up examinations were made on all the 100 patients. A good anatomic result was obtained in 96 and, while 4 patients had residual cystocele or rectocele, in no patient was there a recurrence of uterine prolapse. The morbidity was largely confined to urinary tract infections, chiefly cystitis, which became less frequent with the advent of antibiotics.

There was one case of postmenopausal bleeding following the Le Fort procedure; panhysterectomy was performed and revealed an endometrial carcinoma. The patient made an uneventful recovery.

MISCELLANEOUS

A Study of the Effects of Dihydroergotamine on the Intact Human Uterus: Sympatholytic Properties; Oxytocic Properties. WILLIAM J. GARRETT and MOSTYN P. EMBREY. *J. Obst. Gyn. Brit. Empire*, 1955, 62: 145, 150.

THE ETIOLOGY of inco-ordinate uterine action remains obscure. Excess endogenous adrenaline and over-action of the uterine sympathetic nerves may be contributing factors, so that in recent years the use of an adrenaline-blocking drug has been suggested as the logical therapeutic measure to be applied in such cases. With this theory in mind, dihydroergotamine has held favor with some workers as it is said to possess powerful adrenaline-blocking properties and yet be devoid of the oxytocic activity which is potentially dangerous in labor because of the unpredictable spasm which it may produce.

Statements have been made in clinical publications that dihydroergotamine acts in the intact human uterus as a sympathetic-blocking agent. From the human subject in late pregnancy and labor, direct tocographic evidence has been produced showing that dihydroergotamine fails to block the actions both of adrenaline and of noradrenaline in the doses recommended by its advocates.

Tocographic evidence is produced from 26 healthy puerperal patients that dihydroergotamine is a powerful though somewhat unreliable oxytocic agent.

The dose of dihydroergotamine, if used as an oxytocic in the third stage of labor, would be from 0.75 to 1 mgm. for intravenous injection, and at least twice as much is necessary for intramuscular injection, but for the latter use it does not appear to have any advantage over the better established alkaloids.

The strong oxytocic properties of dihydroergotamine make it a potentially dangerous drug for the treatment of inco-ordinate uterine action in labor.

—*John R. Wolff, M.D.*

The Natural History of Pelvic Tuberculosis; Being the Material Used for the Eighteenth William Blair-Bell Memorial Lecture. TOM BARNS. *J. Obst. Gyn. Brit. Empire*, 1955, 62: 162.

THE NATURAL HISTORY of infection with the tubercle bacillus varies in its course from one individual to another. According to the inherent resistance of the subject, the age, sex, and possibly other factors unknown to us, the disease may reveal itself as one or more of a variety of morbid states affecting the same or different organs. These manifestations can be grouped together under different headings according to the stage of the general infection at which they appear. There are three stages in tuberculosis: the primary or initial stage, the secondary or generalized stage, and the tertiary stage characterized by the development of tuberculous lesions in isolated organs. Today the various types of tuberculosis are often described as primary or postprimary, the primary phase corresponding to stage 1, and the postprimary phase to stages 2 and 3.

Disease of the pelvic organs is merely one of the manifestations resulting from invasion of the body by the tubercle bacillus, but the place of genital tuberculosis in the natural history of this invasion is not fully understood, nor has the route by which infection reaches the pelvic organs been fully investigated. The present study is an attempt to gain further insight into the pathogenesis of female genital tuberculosis and to integrate the etiology of this condition with the wider problem of tuberculosis in general. Pelvic tuberculosis is regarded as a particular manifestation occurring during the course of generalized bodily disease, rather than as an isolated gynecological entity.

The mode of invasion of the genital tract in 107 women suffering from pelvic tuberculosis has been investigated.

A high proportion of patients (73 per cent) showed evidence of other forms of tuberculosis, pleural effusion and tuberculous peritonitis each occurring in

approximately one-third of the cases. In only 8 patients were these lesions still in an active state.

The primary site of tuberculous infection was located in 57 patients: this was found to have been in the lung in 46, in the glands of the neck in 5, in the abdomen in 5, and on the skin in 1 case. This suggests that invasion of the pelvis had taken place by the hematogenous route in at least 52 (90 per cent) of these patients.

Evidence of the site of the primary infection was available in 20 patients who had had tuberculous peritonitis. In only 1 of every 4 of these cases was the site of this primary infection within the abdomen. It would therefore appear probable that peritonitis had arisen in at least 75 per cent of these patients as the result of spread of infected material from a pre-existing tuberculous focus in the pelvis.

The infecting organism was found to belong to the human strain tubercle bacillus in all cases in which culture was successful.

The date of the primary infection was identified in 37 patients. A relationship was shown to exist between the time at which the patient received her first infection and the time at which the infection proceeded to invade the genital tract from this primary source. In many cases it was only a matter of a few months before the invasion occurred; in more than half of the patients (56%) there was evidence that pelvic infection had taken place within 3 years of the primary condition. From this evidence it is believed that dissemination to the pelvis probably takes place during the period of activity of the primary tuberculous lesions.

Genital tuberculosis was shown to be a particular risk accompanying primary tuberculous infection during adolescence. It was suggested that this should provide additional grounds for urging that girls be rendered tuberculin positive by bacille Calmette Guérin inoculation before reaching this age.

—John R. Wolff, M.D.

A 5 Year Community Study of Papanicolaou Screening for Cervical Cancer. PURVIS L. MARTIN, LAURIE W. HIGGINS, THOMAS A. SLATE, and DOMINIC DESANTO. *West. J. Surg.*, 1955, 63: 223.

A 5 YEAR community survey of Papanicolaou screening for cervical cancer in San Diego County revealed widespread adoption of this procedure by private physicians, who used independent private laboratories to read the smears. The patient's demand for the reassurance of a negative smear was a factor in the spread and growth of community screening. Pathologists at first read all smears personally, but as the number increased some of them trained technicians to read the slides.

Patients bear the cost of this program willingly because of the value to each one of a negative smear report. The authors believe that the private physician's office appears to be the most available and practical cancer detection center from which the great humanitarian potential of cytologic population screening can be developed. *—Ely Elliott Lazarus, M.D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Hepatitis in Pregnancy (Hepatitis in der Schwangerschaft). FRITZ HARTMANN and RUDOLF SCHOEN. *Geburtsh. & Frauenh.*, 1955, 15: 305.

THE AUTHORS report on 25 cases of epidemic hepatitis complicating pregnancy—a rare combination.

Spontaneous abortion occurred in 1 instance and there were 5 premature deliveries. None of the babies, premature or full-term, showed congenital abnormalities. There were no stillbirths, but 1 neonatal death occurred; its cause was not determined. In the opinion of the authors, interruption of pregnancy is not indicated. —*Warren R. Lang, M.D.*

Occurrence and Course of Genital Tuberculosis and Pregnancy (Auftreten und Verlauf von Genitaltuberkulose und Schwangerschaft). R. ALEX. *Geburtsh. & Frauenh.*, 1955, 15: 326.

THREE CASES of genital tuberculosis complicated by pregnancy are reported. One patient was a 23 year old para 2 who delivered a living premature female 6 weeks early and then developed miliary tuberculosis and died later of tuberculous meningitis. Animal inoculation several weeks postpartum confirmed the presence of tubercle bacilli in the lochia. The second patient was a 40 year old para 3 on whom tuberculous pelvic inflammatory disease was diagnosed at laparotomy after a period of prolonged bleeding. A placental polyp was discovered in the uterine cavity. The third patient was a 32 year old para 2 who became pregnant after a diagnosis of genital tuberculosis was made on clinical grounds and by animal inoculation. The child was delivered normally at term. The puerperium was complicated by phlebitis but the mother did well.

The combination of genital tract tuberculosis and pregnancy is a rare one. The management is best carried out with antibiotics alone since radiotherapy would damage the fetus. Intervention need not necessarily be resorted to. —*Warren R. Lang, M.D.*

Diabetes and Pregnancy. EDWIN J. DECOSTA. *Obst. Gyn.*, 1955, 5: 401.

IN THE CARE of the pregnant diabetic there are three major precepts:

1. The diabetic patient must have excellent medical care, with emphasis on the prevention of acidosis and the control of glycosuria. This may be accomplished by dietetic regulations and the use of insulin.

2. The diabetic patient must be given conscientious obstetric care. The prenatal visits should be more frequent and include more painstaking care than those of the nondiabetic patient. The earliest indication of complications calls for aggressive action, including hospitalization when necessary. One must always remember that most diabetic patients will be best served by terminating the pregnancy between the thirty-fifth and thirty-seventh week of gestation.

3. The newborn baby of the diabetic mother requires special care and attention. This care is similar to that given a premature infant, regardless of the baby's size or duration of gestation.

To insure a 90 per cent fetal survival, remember the four C's: careful diabetic management, conscientious prenatal care, correct timing of delivery, and complete competent neonatal care.

—*John R. Wolff, M.D.*

Abruptio Placentae with Hypofibrinogenemia; Suggested Management; Reports of Cases. EDWARD M. BARCZAK. *Obst. Gyn.*, 1955, 5: 248.

WHILE the historical concept of hypofibrinogenemia goes back to DeLee (1901), Wilson (1922), and Dieckmann (1936), this clinical picture has only been discussed widely for the last 5 years. The accepted theory of its etiology can be described in the following steps: unusual size of the retroplacental clots, increased intrauterine pressure, escape of decidual or placental thromboplastin into venous sinusoids at the site of the placental detachment, initiation of intravascular coagulation, spotty deposition of fibrin over a large vascular area, decrease of the circulating fibrinogen, and the absence of instability of the clotting mechanism.

The authors suggest (with Weiner, Reid and Roby) as a method of management: clot observation tests at 37 degrees C incubation every 2 hours up to the time of delivery, fibrinogen administration if clot formation fails or lysis occurs, artificial rupture of the membranes to decrease the intrauterine pressure, and when the coagulation mechanism is stabilized delivery from below or by section.

Four cases of abruptio placentae with hypofibrinogenemia and some unusual features are reported. The first case was remarkable in that it seemed to be the first reported incidence of this syndrome in the middle trimester of gestation. The second patient died after a nonresponding toxemia and cesarean hysterectomy for abruptio placentae with the Waterhouse-Friedrichsen syndrome and multiple hemorrhages in all of the abdominal organs, particularly in the adrenal glands. Fibrinogen could not be given early enough to avoid irreparable damage.

In another case no massive separation was seen, but complete afibrinogenemia occurred after normal spontaneous delivery. The fourth patient was admitted as an eclamptic, and the placenta detached itself at the time of spontaneous delivery. Even though the fibrinogen defect was immediately corrected, the patient died from the complications of a Couvelaire uterus, lower nephron nephrosis, hemorrhages in the liver and motor cortex, and a progressive thrombocytopenia.

None of these babies survived and only 2 of the mothers. It was noted that the amount of fibrinogen given often did not account for the unexpectedly high rise in the fibrinogen plasma levels. Even small amounts administered seem to stimulate the production or release of fibrinogen in the maternal organism. Speed of administration is most important to forestall

irreversible changes in the vital organs as a result of the hemorrhagic diathesis.

—*W. D. Bergman, M.D.*

LABOR AND ITS COMPLICATIONS

One Thousand Cesarean Sections in the Modern Era of Obstetrics. CHARLES LEAVITT SULLIVAN and ELMORE M. CAMPBELL. *Obst. Gyn.*, 1955, 5: 669.

IN A GROUP of 1,000 cesarean sections the authors have shown the relative safety of the procedure with a great number of statistical figures. While there used to be one maternal death in 450 deliveries as recently as 1945, and one death in 950 deliveries 5 years ago, the mortality has decreased to 6 per 10,000 live births in 1953, at a time, that is, when cesarean sections have at least doubled and have become much safer because of antibiotics, blood banks, better anesthesia, and other factors. However, since section rates still vary between 0.5 and 14 per cent throughout the country, it appears that indications for abdominal delivery are far from being standardized. Statistical figures of comparison between private and ward cases furnish evidence that too hard an effort to keep section rates down in the latter group will increase the mortality and morbidity of both mothers and infants significantly.

Eleven and two-tenths per cent of the sections were done in the maternal, 34 per cent in the fetal, and 54.8 per cent in the common interest, no further definition being given for these groups. There were 532 primary and 468 repeat operations, an incidence of 4.3 and 3.7 per cent respectively. Primary sections were done three times more commonly in the fetal than in the maternal interest. There were nearly six times more primary emergency sections than repeat emergency sections. The morbidity according to maternal or fetal indications was equal in both groups (19%).

Low cervical sections comprised 83.6 per cent of the total, extraperitoneal sections 10.1 per cent, classical sections 3.6 per cent, and cesarean hysterectomies 2.7 per cent. The first three groups have a similar morbidity of about 14 per cent according to the number of patients, while the morbidity according to the number of days is nearly three times as high in the classical type as in the section with the extraperitoneal approach. The number of previous sections did not influence the fetal or maternal morbidity. The presence of shock (in 8.5 per cent of cases) and labors exceeding 12 hours doubled the maternal morbidity rate, and the duration of ruptured membranes over 12 hours nearly tripled it.

Three ruptured uteri were encountered, all in patients with previous classical sections and before the thirty-eighth week of gestation. Of 744 previous uterine scars examined 735 were deemed adequate, and the authors believe that sterilization after cesarean section is unnecessary. They also believe that a repeat section is the method of choice rather than the hazard of a delivery from below.

There was a maternal mortality rate of 0.3 per cent, none of the 3 deaths being associated in any way with the technique of section. The neonatal death rate, corrected for 8 cases each of erythroblastosis fetalis and anomalies incompatible with life, was 4.4 per cent. The emergency character of the section accounted for 61 per cent of the infant mortality. In elective sections the risk to an infant weighing 2,500 gm. or more appears to be about 12 per 1,000 operations.

The primary elective section is probably best performed after about 6 hours of labor or 12 hours after the rupture of the membranes in the interest of conditioning the infant to extrauterine existence. Of the infants 16.7 per cent were premature, and 39 per cent of the premature infants were in the group of infants given elective procedures, which fact is a further confirmation of the extreme difficulty in estimating the fetal maturity in utero. —*W. D. Bergman, M.D.*

PUERPERIUM AND ITS COMPLICATIONS

Puerperal Mastitis in the Penicillin Era; Observations on 1,100 Cases in the City of Leipzig (Die Mastitis puerperalis in der penicillinara; Beobachtungen on 1,100 Faellen aus der Stadt Leipzig). HUGDIETER NOACK. *Geburtsh. & Frauenh.*, 1955, 15: 224.

THE AUTHOR studied 1,100 cases of puerperal mastitis occurring during the so-called "penicillin era" (June 1, 1950 to March 31, 1954). The frequency of this condition in the clinic varied from 3.9 per cent in 1950 to 7 per cent in the first quarter of 1954. Among home deliveries such a rise was not noted so that only approximately 1 per cent of patients delivered at home developed mastitis. The cause of the infection in the hospital is usually a penicillin-resistant variety of hemolytic staphylococcus aureus.

The disease, on the average, reaches its height at about 4 weeks after delivery. Primiparous women are more prone than multiparous. The right and left breast are about equally involved and in 24 per cent of cases both breasts are affected. Outer breast quadrants are more susceptible than the inner; 10 per cent of mastitis is central in location. There was no correlation between mastitis and duration of labor, age of mother, birth trauma, and sex of the child.

About 50 per cent of early cases subsided with routine care, especially with the effective antibiotic. The author has himself had best results with streptomycin and chloromycetin. Penicillin should not be used since the causative organism is so frequently penicillin-resistant and some strains even grow better as a result of its use. In early mastitis x-ray treatment is of value. Incision is of little value until there is abscess formation.

Prophylaxis rests on careful disinfection, including such measures as ultraviolet light and aerosol. The administration of antibiotics prophylactically is to be condemned. —*Warren R. Lang, M.D.*

NEWBORN

Congenital Hereditary Cataracts and the Problems Which They Pose to the Obstetrician (Les cataractes congénitales héréditaires et les problèmes qu'elles posent à l'accoucheur). A. J. BRET and L. FAURE. *Rev. fr. gyn. obst.*, 1955, 50: 112.

THE AUTHORS consider the problems of congenital cataract in the newborn and give a case presentation of a para 2, gravida 3, whose first 2 infants had cataracts

diagnosed at birth. Term deliveries occurred. The first child exhibited a generalized muscular atrophy and mental retardation. The second had no associated deformities. Both died of meningitis, the first at 2 years and the second at 9 months. Although the family history was completely negative, the patient was found to have a congenital cataract. Other findings were: a slightly elevated cholesterol, lowered blood vitamin levels, and congenital left hip dislocation.

The embryology of the lens and the types of congenital cataract described in the literature are reviewed. It is apparent that the earlier the lesion develops during pregnancy, the smaller and more central is the cataract. Later lesions are larger and more peripheral. Conditions associated with congenital cataract were: rickets, convulsive states, mental retardation, and malformations of the eyes, heart, bones and eighth cranial nerve.

In some patients cataracts appear to be hereditary, following the pattern of a dominant characteristic. In others metabolic disorders, virus infection, and chemical poisoning may be the cause. Experimental work suggests that the latter causes may have some influence upon hereditary factors. This interplay of hereditary and acquired causes may lead to great difficulty for the obstetrician in trying to determine whether congenital cataract should be anticipated in any given case.

—George C. Lewis, Jr., M.D.

Maternal Hydramnios and Congenital Anomalies of the Central Nervous System. Richard A. Prindle, Theodore H. Ingalls, and Samuel B. Kirkwood. *N. England J. M.*, 1955, 252: 555.

Hydramnios, anencephalus, fetal death and many "monstrosities" seen in association with them are interrelated components of maternal placental fetal disease.

Because of experimental observations and because the large majority of babies produced by women with hydramnios have defects of organs differentiating at an early stage of embryonic life, the assumption is made that hydramnios in the human being usually has its genesis in the first trimester of pregnancy.

The associated conditions, sometimes local, sometimes systemic, have a common action in their capacity to interfere with the fetal and placental circulation, and the oxygen and fluid balance. The fact that hydramnios is frequently associated with an anomalous development of both the placenta and the baby suggests that both defects are developing concomitantly and that they are manifestations of the same maternal disease. Laboratory evidence for this concept is fragmentary. Further study of the problem might profitably be pursued experimentally, with greater attention to the maternal organism as the environment of the fetus. Correlations should be sought among maternal history, physical examination, the course of pregnancy, the placental characteristics, and the physical examination of the child.

The implication is that much placental disease with accompanying hydramnios, fetal death, and defect is preventable with a better understanding of causation.

Enough has been learned to show that the challenge is not one of describing the pathogenesis of a specific clinical syndrome (hydramnios) but the exploration of a whole system of prenatal deaths and infant defects as manifestations of maternal disease. This is a complex problem involving the concerted exercise of many disciplines of both medicine and public health.

—Charles Baron, M.D.

MISCELLANEOUS

The Cylindrical Uterus in Obstetrics (Les utérus cylindriques en obstétrique). R. Weill and C. Colette. *Rev. fr. gyn. obst.*, 1955, 50: 135.

In order to understand the role of the cylindrical uterus in obstetrics, 2,277 deliveries during the year of 1951 at the Obstetrical Clinic in Nancy, France were reviewed. The uterus was considered cylindrical when, at term, the longitudinal axis was much more developed than the transverse axis.

Sixty-six cases fitting this description were discovered. In a study of all possible related antecedent factors, the only significant finding was that women with a cylindrical uterus were generally underdeveloped. The condition was noted in 6 per cent of the primigravida and in 1.22 per cent of the multiparous women.

Seventy-five per cent of the women with a cylindrical uterus exhibited some degree of uterine inertia and a tendency to false labor. In one-half of these cases the condition was mild and easily corrected. One-third of the cases were complicated by major degrees of inertia requiring medical or surgical intervention to overcome the difficulty. Injudicious use of medications during labor seemed to increase the difficulties. Postpartum subinvolution appeared to be a common problem. The etiology of the condition was believed to be best explained by immaturity of the uterine musculature resulting in an imbalance of the longitudinal and circular fibers.

—George C. Lewis, Jr., M.D.

Hypofibrinogenemia and Defects of Coagulation. C. Paul Hodgkinson, John H. Luzadre, Paul W. Pifer, Laymond A. Swinehart, and Donald G. Remp. *Obst. Gyn.*, 1955, 5: 465.

Accumulated evidence suggests broadened physiologic and pathologic functions for the coagulation system. The physiologic role of fibrin to form clots and arrest hemorrhage to local sites of trauma is accepted. Defibrination of circulating blood is generally considered pathologic. Homeostatic regulators for the coagulation system in cellular metabolism have not been emphasized. The plasma fibrinogen level represents the homeostatic balance between the normal anabolic-catabolic cellular activity of the body metabolism as opposed to hepatic regenerative activity.

It is evident that this physiologic balance is easily disturbed. Cell injury and its healing process requires fibrin. Plasma fibrinogen studies demonstrate biphasic reaction in response to trauma. Immediately following cell injury defibrination from intravascular coagulation results from hyperthromboplastinemia. This reaction is reflected by depression of the plasma fibrinogen concentration. Termination of the inciting injury interrupts excessive fibrinogen utilization, and recovery from hepatic regeneration follows. If an inflammatory process follows, excessive fibrinogen regenera-

tion occurs which is reflected by elevated plasma fibrinogen levels.

Originally identified with abruptio placentae, the clinical conditions known to be associated with pathologic defibrination have rapidly expanded to include anmiotic fluid embolism, intrauterine retention of a dead fetus, convulsive eclampsia, postpartum hemorrhage, and surgical trauma. Other conditions probably associated with defibrination are bilateral renal cortical necrosis, pituitary necrosis, forceps delivery trauma, hydatidiform mole, incompatible blood transfusions, and certain intravenous reactions such as those following the infusion of trypsin solutions and certain plasma expanders.

The importance of massive embolization from intravascular coagulation as an important pathologic mechanism is gaining recognition. Obstetric shock and nonhemorrhagic traumatic shock are possibly on this basis. Organ insufficiency from fibrin embolization, such as pituitary necrosis, bilateral renal cortical necrosis, and certain forms of cerebral thrombosis, has been suggested as being associated with defibrination.

The spectrum of effects resulting from lesser degrees of defibrination have been identified with many types of tissue injury. Surgical trauma, absorption of the products of aseptic necrosis from intrauterine fetal autolysis, and uteroplacental trauma are well documented from serial fibrinogen studies. Excessive muscular activity has been suggested as a thromboplastin-provoking reaction. Convulsive eclampsia and unusually severe uterine contractions have been associated with fibrinogen depression. The observation that fibrin emboli and hemorrhage from defibrination have never been observed in nonconvulsive toxemia suggests the importance of abnormal muscular contraction as a defibrinating factor.

Realization that the degree of surgical trauma may be directly related to the extent of defibrination is a sobering thought. One questions if flooding the circulatory system with insoluble fibrin during and immediately following a cutting operation may not serve as the nidus for subsequent phlebothrombosis and pulmonary embolism. These factors place a premium on atraumatic surgical procedures and especially upon atraumatic surgeons.

In conclusion, it may be stated that the process of defibrination is both physiologic and pathologic. Neither the full importance nor the entire scope of the syndrome is known. Much experimental study will be necessary before the process can be given its proper category of importance. —*John R. Wolff, M.D.*

Pheochromocytoma and the Obstetrician. ARTHUR A. GEMMELL. *J. Obst. Gyn. Brit. Empire*, 1955, 62: 195.

THREE additional cases of pheochromocytoma are reported, 2 of which were observed during pregnancy. There is an excellent bibliography of the literature, which includes references to 212 cases of pheochromocytoma in the female. These cases are reviewed.

The age incidence was interesting in that the vast majority of patients were in the child-bearing age. Eighty-five of these women were known to have been parous and approximately one-third of them gave a history of previous toxemia. In one-third of the women the symptoms leading to the diagnosis were associated intimately with the pregnancy—in half of them during the pregnancy, and in half of them during the early puerperal period. The symptoms consisted of severe headaches, nausea and vomiting, sweating, palpitation, blanching of the extremities, apprehension, substernal or epigastric pain, dyspnea, vertigo, and eye signs. The symptoms were periodic in nature.

These patients also exhibited attacks of rather severe hypertension, and, because of the frequent association with pregnancy, the symptoms have often been mistaken for toxemia. The attacks seem to regress between pregnancies. One possible explanation is the mechanical pressure of the pregnant uterus on the tumor, giving rise to more frequent attacks at this time.

The production of the hypertensive episodes with intramuscular histamine, the immediate fall of at least 40 mm. in the systolic blood pressure following injections of piperoxane, dibenamine or regitine, and perirenal pneumography are of considerable value in the diagnosis.

The treatment is surgical removal as soon as possible. Malignancy occurs in approximately 5 per cent of the cases. —*James F. Donnelly, M.D.*

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Acute Renal Failure Following Angiography; Especially the Risk of Repeated Examination Revealed by 8 Cases (2 Deaths). NILS ALWALL, SVEN JOHNSSON, AXEL TORNBERG and LARS WERKÖ. *Acta chir. scand.*, 1955, 109: 11.

IN A SERIES of 8 cases from three Swedish hospitals, the authors have demonstrated that renal injuries of a temporary nature and of severe, deadly nature (two deaths) can occur following angiography. In some cases the injury can be explained by repeated injections of the contrast media; there may be no apparent reason for reactions in other cases. Because of the possible risk involved, strict indications for this type of examination are mandatory. The obvious risks may be diminished by lessening the amount of contrast media used. The renal function should be carefully checked before attempting angiography. This procedure should not be limited to nonprotein nitrogen determination, but an estimation of the maximal concentration capacity, combined with the Addis quantitative test, would seem to supply more reliable information as to the renal function prior to examination.

The first reported case was that of a 54-year-old man who had repeated angiography on the same day. The first injection of 30 ml. of 70 per cent umbradil was given on a level with the artery of the healthy kidney, which received the whole amount of the contrast media. Upon the second injection the contrast media went to both kidneys. When a nephrectomy was done 3 days later for renal tumor, the nonprotein nitrogen was normal. The patient subsequently expired, and the probable cause for the fatality was a tubular nephritis due to the injection of the entire amount of contrast media into the artery of the normal kidney. The renal injury was not manifested until after nephrectomy. It must be noted too that during the immediate postoperative period there ensued certain procedures that may also have contributed to this fatality.

The second patient was a boy, aged 9, in whom an angiogram was performed; 22 c.c. of 60 per cent umbradil were used. Uremia developed following this procedure. Two and one-half months after angiography the renal function was normal. In this patient, the renal angiography brought on a relatively slight renal failure, but the injury was reversible.

In a woman, age 20, an angiogram was performed by catheterization of the femoral artery. The first injection was made with the use of 30 ml. of 60 per cent umbradil. After moving the catheter, more contrast media was injected. Three days later roentgen pictures still showed contrast media in the kidneys and intestines. Acute renal failure followed this examination, but after a period of 1 month the renal function had returned to normal.

The fourth case was that of a 7-year-old boy who, because of technical difficulties, had repeated angiography on the same day, using 35 to 40 ml. of 70 per cent umbradil. The patient's uremia had subsided by the tenth day, and he seemed little affected by the anuria.

The fifth case was that of a 66-year-old man in whom an angiogram was performed with the use of 50 ml. of 70 per cent trijodyl. He developed uremia and anuria. Renal dialysis on the twenty-ninth day was followed by some improvement, but he expired 5 days later. Autopsy revealed tubular nephritis in degeneration, along with its complications, among them being purulent pyelonephritis.

In the sixth case, a 58-year-old woman developed temporary renal injury following an initial injection of 30 ml. of 60 per cent umbradil injected into a catheter inserted through the femoral artery. The catheter was inserted further, and a similar injection was made. The authors point out in this case that the injection of contrast media was repeated at the same investigation. Following this repeated injection, the patient developed an oliguria (lowest 400 ml.) and an elevated nonprotein nitrogen (highest 87) that returned to normal in 3 weeks.

The seventh patient in this series was a 63-year-old woman in whom an angiogram was made with the use of 30 ml. of 70 per cent umbradil. The catheter in the aorta was placed 4 cm. below the origin of the renal arteries. It was thought that this examination produced considerable acute injury to the kidney. This case emphasizes the importance of determining renal function prior to angiography in order to determine the extent of kidney damage following the injection of the contrast media.

The final case of the series was that of a 16-year-old girl in whom an angiogram was made with the use of 70 per cent umbradil because of a diagnosis of coarctation of the aorta. Following the examination, the nonprotein nitrogen rose to 220 mgm. per cent; however, after 3 weeks the renal function had apparently returned to normal. Although the investigation was free from complications, it resulted in transitory kidney injury. —*Conrad A. Kuehn, M.D.*

Coagulum Pyelolithotomy. JOHN E. DEES. *J. Urol.*, Balt., 1955, 73: 445.

THE AUTHOR discusses the use of a fibrin clot to enmesh and permit the removal of small intrapelvic calculi. He reports on 73 coagulum pyelolithotomies. Nine of these must be classed as failures. In 8 cases there was failure to remove all stones present, and in 35 cases all stones were removed.

The use of bovine fibrinogen is discussed and the author concludes that it is essentially nonallergenic when used in the renal pelvis. He exposes the pelvis and ureter, makes a small opening in the pelvis, and, after determining its capacity, introduces fibrinogen dissolved in Ringer's solution (Ringer's solution is preferable to saline since it contains calcium which is necessary to clot formation), and simultaneously introduces thrombin. The resultant fibrin clot usually en-

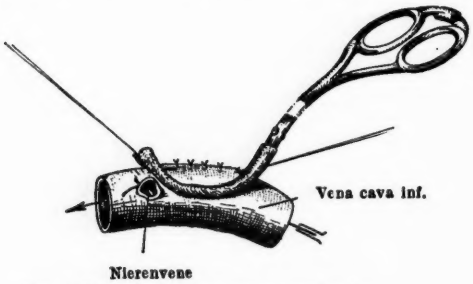


FIG. 1 (Hennig). Nierenvene-renal vein.

meshes all small calculi. After a period of 5 minutes the fibrin clot is removed through the pelvic incision and examined to determine the number of stones contained in it. The author uses freshly made solutions of 4 per cent fibrinogen and thrombin 30 u/cc. He notes that one coagulum removed all 26 of the small stones observed in the preoperative roentgenogram.

—C. Barber Mueller, M.D.

Diagnostic Errors in the Study of Renal Tumors (Dos erros de diagnóstico nos tumores do rim). CARLOS RENATO GREY. *Rev. brasil. cirurg.*, 1955, 20: 21.

THIS STUDY represents an evaluation of the diagnostic process in renal tumors. The value of the clinical and laboratory data is analyzed and 2 cases are reported in which the information obtained was misleading with regard to the true nature of the conditions present.

It is concluded that the absence of signs or symptoms forming part of the syndrome of renal tumor creates a more difficult diagnostic problem. Urographic examination remains as the best diagnostic aid available, but the presence of abnormal urographic findings is not conclusive evidence of the presence of a neoplasm. The presence of a mass is also equivocal. In the presence of signs and symptoms of infection it is most important to establish a differential diagnosis between infected renal tumors and renal and perirenal infections. *—Néstor S. Martínez, M.D.*

Injury of the Inferior Vena Cava During Nephrectomy (Das Problem der unteren Hohlvenenverletzung bei Nephrektomie). O. HENNIG. *Zschr. Urol.*, 1955, 48: 1.

THE MORTALITY from injury to the inferior vena cava amounts to about 50 per cent. Death can result from exsanguination or from an air embolus. A brief review of the anatomy and the physiology of the vena cava will lead to a better understanding of the sequelae of injury of this vessel. The inferior vena cava gathers all the blood from the lower extremities, from the pelvis, and from the spine. It is a valveless tube. Half way to the heart it receives both renal veins. The left renal vein is thicker and longer than the right and enters the cava more proximally. This is important if the vena cava is to be ligated, for life can be maintained only if the ligation is distal to the entrance of the left renal vein after a right nephrectomy.

Two-thirds of the blood which reaches the heart comes from the lower venous system and one-half of this volume derives from the portal circulation. There is a considerable difference in the venous pressure of the superior vena cava as compared to the inferior vena cava. The pressure in the superior vena cava is negative and in the inferior vena cava it is positive. Because of this difference in the venous pressure, the danger of an air embolus is actually far greater if the superior vena cava is opened than when the inferior vena cava is injured. On the other hand, the possibility of exsanguination is greater in injuries of the inferior vena cava. Actually the danger of an air embolus through an opening in the inferior vena cava has been greatly exaggerated and should not be the primary concern of the surgeon.

The results of ligation of the inferior vena cava have been variable. Papin reported 6 deaths in 15 cases; Ubelhor had 6 deaths in 19 cases; Boeminghaus, on the other hand, reports that he has repeatedly ligated the vena cava without any ill effects. These differences can perhaps be explained on the basis of a normal or abnormal cardiovascular system. Naboff in 1953 ligated the inferior vena cava below the renal veins in 20 dogs. Most animals remained alive and their hind limbs showed no edema. The venous pressure, which amounted to 6 to 10 cm. of salt solution, rose immediately after the ligation of the inferior vena cava to 3 or 4 times this level. None of the animals, however, maintained their elevated venous pressure for more than 3 days, and in the course of 12 months the venous pressure returned to normal and remained so. The development of a collateral circulation can be demonstrated within the first week after ligation by venograms, by infrared photography, and by polyvinyl injection of the veins. The main collateral network embraces the vertebral veins and the vessels of the posterior wall. They enter the vena cava above the level of the renal veins. Large veins also appear along the course of the ureters and empty into the renal veins. These findings were corroborated by Müller in 1953. Olschanetzkij and Spasskij in 1954 ligated the inferior vena cava above the entrance of the renal veins in dogs. None of the animals survived. The re-establishment of the circulation goes through three stages. First, the stage of decompensation which lasts 2 or 3 days. Second, the stage of "subcompensation" which lasts 1½ weeks following the period of decompensation. During the final stage the collateral circulation is well established.

Clinically, the ligation of the inferior vena cava has at times been fatal because, added to the shock of blood loss, there is an increased load on the heart which results from ligation of the vein.

The inferior vena cava is prone to injury above or below the entrance of the renal veins, by the injudicious pull on the spermatic or ovarian veins and by avulsion of the renal vein itself from the caval wall. Transverse section of the inferior vena cava is extremely rare, although one such case has been reported by Delbert in which the vein had been mistaken for a dilated ureter.

To repair an injured vena cava the first step is to prevent exsanguination of the patient by compression of the vena cava. Gauze packs can be used for this purpose. The best method, however, is manual compression of the injured vein against the vertebral

column. The incision should then be enlarged upwards and downwards so that excellent exposure of the depth of the wound can be had. The compression of the vein can be taken over by an assistant while the surgeon attempts to include the injured portion of the vena cava in a rubber-tipped curved clamp. The tear can then be carefully repaired with fine suture material (FIG. 1). —*S. Richard Muellner, M.D.*

Injuries of the Ureter (Harnleiterverletzungen). RÜTGER HASCHE-KLÜNDER. *Chirurg*, 1955, 26: 148.

FOLLOWING a trip to England, where the author saw excellent results from the Baori plastic operation on the bladder and ureter at St. Peter's Hospital in London, England, he wishes to call the attention of the profession to the benefits to be derived from the Baori technique.

This procedure is described and illustrated; however, the description does not differ essentially from previous descriptions except, perhaps, for the fact that the splinting or draining catheter, or catheters, are not led out through the suprapubic abdominal incision but are passed through a large urethral catheter inserted into the bladder by way of the urethra.

As in the previously described techniques a flap of bladder is turned up and brought to embrace the proximal stump of the dehiscent ureter, the distal ureteral stump being ligated. The bladder is then completely closed.

The author recommends, of course, that the indication for this operation, or on rare occasion the Couvelaire operation (transplantation of the ureter, or ureters, to an isolated section of intestine, which in turn is anastomosed to the bladder) should be considered only in those instances in which the preservation of the kidney seems to be worth while. In case such a decision is made, the operation should be done as early as possible, before any deterioration of the renal functional capacity has had time to develop.

A detailed description of the operation of Baori, which is apparently identical with the one described and documented here, is contained in an abstract (SURG. GYN. OBST., INTERNAT. ABSTR. SURG., 1954, 99: 176) by the French authors Renè Kuess and J. Holzer (*J. urol. méd.*, Par., 1953, 59: 578).

Even in the instances in which the ureter has been intentionally sacrificed (advanced gynecological cancer with roentgen-destruction) an attempt should subsequently be made to rescue the affected kidney when that kidney is deemed capable of regaining its functional capacity. —*John W. Brennan, M.D.*

BLADDER, URETHRA, AND PENIS

Dangers of Urethrography (Gefahren der Urethrographie). K. SCHEELE. *Zschr. Urol.*, 1955, 48: 141.

THE ABSENCE of a submucosa in the membranous portion of the urethra, the glands of Littre, and the intensive venous network surrounding the urethra make it possible for contrast media to break through the mucous membrane and to enter the venous channels during urethrography. Rapid injection of a contrast medium and the exertion of strong pressure on the syringe during the injection predisposes to extravasation.

An ideal contrast medium should not irritate the mucous membrane, it should be well tolerated if injected intravenously, and it should not harm the tissues. It should be soluble in water, easily excreted, and should not have a tendency to form deposits. In addition, it ought to yield a good x-ray shadow and should be inexpensive. Barium sulfate preparations are too dangerous for urethrography. Substances such as kollargol, a coloidal silver preparation, and thorotrast are also not suitable. Lipiodol, likewise, is not an ideal medium since oil emboli from lipiodol have been reported. The author considers perabrodil, in concentrations up to 80 per cent, to be the safest medium since it can be injected intravenously, it does not form deposits, and is easily absorbed. It causes very few reactions, and does not irritate the mucous membranes.

Urethrography should not be performed with excessive pressure and should be interrupted at once if there is any local discomfort or a generalized reaction. It should not be performed following bouginage of the urethra, if the urethra is bleeding, or if false passages are suspected. Urethrography is also inadvisable in the presence of infectious urethritis.

—*S. Richard Muellner, M.D.*

GENITAL ORGANS

Transcervical Prostatectomy: a New Technique in the Retropubic Approach; Preliminary Report. ABDEL RAHMAN EL-SADR. *Alexandria M. J.*, 1955, 1: 3.

THE RETROPUBIC ROUTE in prostatic surgery was first introduced in 1909, but it was not until the report of Millin, in 1954, that it achieved general recognition. While Millin advocates a transverse capsular incision, the author prefers a longitudinal one, cutting through the bladder neck and extending into the lower bladder segment just far enough to allow exposure of the prostatic adenoma.

After studying the sources of bleeding in the retropubic route, the author concludes that, in order of importance, these sources are the lateral venous plexuses, the superficial central branch of the deep dorsal vein of the penis, the periprostatic venous plexus and branches of the anterior capsular arteries, and the prostatic arteries at the bladder neck. He goes on to discuss the causes of bleeding which can occur, the different steps in the operation at which they occur, and methods of dealing with the bleeding when it occurs.

The author describes his technique in detail with accompanying illustrations. He has devised a self-retaining bladder neck retractor which he uses to expose the prostatic adenoma and capsule. He advises against whole thickness ligatures or extensive coagulation in the control of bleeding since these lead to necrosis and delayed urinary leakage. Spurting arteries are caught and lightly coagulated.

A no. 20 or no. 22 French Foley catheter with a 5 c.c. bag is employed. In closing the bladder incision just enough tension must be used, since excessive tension causes tissue necrosis and delayed leakage. When the suture line is water-tight, the abdominal wound is closed with a drain placed in the cave of Retzius. The drain is removed in 24 to 48 hours, and the catheter after the third day.

The author reports 30 cases of benign prostatic hypertrophy in patients operated upon during an 8-month period by the retropubic transcervical technique. The adenomas removed varied in weight from 24 to 150 gm., with an average weight of 58.5 gm. Primary leakage of urine occurred in 3 cases (of the first 9) and delayed leakage in 1 case. After the catheter was removed, urinary control was perfect in 26 cases, one patient had stress incontinence, and 3 had temporary incontinence; all cleared within 24 to 48 hours.

The patients were discharged in from 9 to 43 days with an average of 16.5 days. Wound infection and pelvic cellulitis were the most important factors in prolonging convalescence. In 1 case, mild periostitis pubis developed. No postoperative urinary obstruction was observed. One patient died postoperatively of cerebral apoplexy.

Since the preparation of this paper an additional 24 patients were operated upon by this technique with one death, a mortality rate of less than 2 per cent.

—*Robert Paradny, M.D.*

The Incidence and Type of Bacteremia at the Time of Various Prostatectomy Procedures. DAVID N. GREY. *J. Urol.*, Balt., 1955, 73: 709.

THIS REPORT demonstrates the fact that the employment of an antibiotic agent does not prevent at least a transient bacteremia following the various types of procedures used in the removal of the prostate. In this study 203 patients subjected to prostatectomy were given 1 gm. of aureomycin orally in divided doses in the 24 hour period preceding surgery. The aureomycin was given in addition to any other antibiotic or chemotherapeutic agent the patients were receiving. Blood cultures were drawn immediately following the operative procedure.

Of 124 patients undergoing suprapubic prostatectomy, 20.2 per cent were found to have positive blood cultures. Twenty-four of the 38 organisms cultured in these cases were of the gram-positive coccal type, 4 were of the diphtheroid class, and the remainder were of the gram-negative bacillary type. Of the 66 patients subjected to transurethral resection of the prostate, 54.5 per cent were found to have positive blood cultures. In this group 30 of the 36 organisms isolated were of the gram-negative bacillary type. No organisms were found in 6 patients subjected to perineal prostatectomy and 7 subjected to retropubic prostatectomy.

Although these findings are of interest, there was no demonstrable increase in mortality or morbidity in the patients in this series who had positive blood cultures.

—*John T. Grayhack, M.D.*

Retention of the Testis and Its Treatment (Zur Retentio testis und ihre Behandlung). HUBERTA FANTA. *Klin. Med.*, Wien., 1955, 10: 69.

TWENTY-THREE PATIENTS with retentio testis were given treatment at the First Surgical Clinic of the University of Vienna, in the period from 1951 to 1954. To 12 of these, hormone treatment was administered. The hormone preparation used was the gonadotropic component of the hormonic secretions of the anterior lobe of the hypophysis. The dosage given consisted of 1,000 units, injected intramuscularly, for total dosages of 8,000 to 10,000 units. The treatment was applied only in boys, shortly before the advent of puberty.

As to the results of treatment, in a 13 year old boy with bilateral inguinal testicles a definite increase in size of the gonads developed under treatment with a definite lowering of the intrascrotal position of the organs; however, the downward movement did not go farther than the tuberculum pubicum. In a second patient, a 10 year old boy with bilateral inguinal testicles, the right testicle descended into the scrotum, but the left could still be only barely palpated in the inguinal canal. In all the other cases the testicle became definitely larger, the external genital organs as a whole increased in size, and the patient developed satisfactorily in his masculine characteristics; however, there was no definite descent of the testicles. In none of the patients on the authors' service did hormone therapy permit dispensing with surgery.

With reference to surgical treatment, since 1951 the authors' service has been routinely using the technique of mobilization of the testicle to the scrotal pocket of the opposite side, as recommended by Ombrédanne (*Clinique et operatoire di chirurgie infantile*, Paris, 1949). The operation of Ombrédanne consists essentially in passing the mobilized testicle through an incision into the scrotal septum and retaining it in the opposite scrotal compartment by closing down the incision by means of a few sutures in the septum itself. The operation may be done bilaterally, the two organs thus coming to lie on the opposite sides of the fascial septum with intercrossing of the cords.

The material on which this operation has been used, that is, the 32 patients treated since 1951, consisted of 6 patients with bilateral retentio testis (2 with evidence of endocrine disturbance), 10 patients with testicular retention on the left side and 7 on the right side. Three patients had been unsuccessfully operated upon previously. The youngest patient was 8 years old and the oldest was 30 years old.

In 14 of the 17 patients with unilateral retention the transscrotal testicular fixation operation of Ombrédanne was accomplished with excellent results. In 3 of the patients with bilateral retention excellent results were obtained from the operation applied bilaterally at an interval of 4 months. In 1 patient with bilateral retention the operation was carried out on the left side. Follow up showed the transferred organ was well developed, lying loosely in the scrotum and without symptoms of any sort.

In 2 patients in this material the testicle had to be removed. The patients were boys, both 12 years of age; they had a normally developed organ on the opposite side and the intra-abdominal testicle could not be sufficiently mobilized to bring it down into the scrotum. In both instances the extirpated organ was found to be hypoplastic with no histologic evidence of spermiogenesis.

In 3 patients the Ombrédanne technique could not well be carried out; these were patients in whom the organ could not be brought down far enough. In one (a 14 year old boy with intra-abdominal retention), the gonad was fixed subcutaneously just outside of the external ring. In a 21 year old man with bilateral inguinal retention the left testicle when fixed transscro-

tally underwent atrophy; the other organ was then fixed subcutaneously, as in the case just described. In a delicately constituted boy with a hernia on the left side and bilateral inguinal retention, the hernia was repaired and the testicle was fixed subcutaneously before the inguinal ring as described previously. In this instance a course of hormone treatments was recommended with the necessary operative procedures to be carried out later, before the onset of puberty.

Finally, there are a few words concerning malignant degeneration in these retained organs. In the First Surgical Clinic from 1928 to 1954, there were 4 patients, in addition to the 223 patients (200 of these from the period 1928 to 1951 were reported by Stern: *Prakt. Arzt*, 1952, 62: 387) received for treatment of testicular retention, who were received for treatment of a malignant degenerated, retained testicle. Insofar as these figures can be collated, it would seem that the danger of malignant degeneration of a retained testicle is 1.7 per cent; however, during this same period, there were 34 instances of malignant testicular degeneration in normally placed organs. Thus, the danger of malignant degeneration of these retained testicles would not seem to be as great as generally suspected.

—*John W. Brennan, M.D.*

MISCELLANEOUS

Some Uses of Cortisone in Urology, with Special Reference to Osteitis Pubis. ROLAND THORNLEY. *Brit. J. Urol.*, 1955, 27: 1.

THE AUTHOR reports his experience with the use of cortisone for the treatment of a relatively small number of patients with osteitis pubis, interstitial cystitis, or a contracting tuberculous bladder. Three patients with osteitis pubis without evidence of sepsis were treated. In 2 of the patients the disease developed following retropubic prostatectomy; in the third patient it followed childbirth. In all 3 the symptoms were marked. There was roentgenographic evidence of the disease in each instance. Cortisone administration produced prompt relief in all of the patients. Two patients were treated with 50 mgm. of cortisone twice daily for 2 days, followed by 25 mgm. twice daily for 11 and 16 days; in the third case the 50 mgm. dosage was resumed for 3 days after the patient had failed to respond satisfactorily by the fourth day of therapy; 25 mgm. of cortisone were then given twice daily for 8 more days.

Three patients with interstitial cystitis were treated. The dosage schedule for the administration of cortisone was similar to that employed in patients with osteitis pubis. The results were discouraging.

The author employed cortisone in combination with streptomycin, PAS, and isoniazid in an attempt to reverse the tendency toward formation of a contracted bladder in 2 cases of urinary tuberculosis. He pointed out that recent evidence suggested the theoretical objections to the use of cortisone in tuberculosis were unfounded. In one patient whose bladder capacity was 50 ml., the administration of 25 mgm. of cortisone twice daily was without apparent effect. In another patient, in whom the bladder capacity had diminished from 250 to 150 ml. while she was under observation, the administration of 25 mgm. of cortisone twice daily seemed to be associated with a gradual improvement.

In the discussion of this paper, Professor Hellstrom, of Stockholm, reported on his experience with the use of cortisone in patients with carcinoma of the prostate. He stated that since testosterone is transformed chiefly into androsterone and etiocholanolone, determination of the urinary excretion of these steroids in instances in which an attempt is being made to eliminate body androgens would probably be an objective assay of the effectiveness in this regard of a particular therapeutic regimen. In treating 10 orchectomized patients with carcinoma of the prostate with 50 to 100 mgm. of cortisone daily, the discussant states that the clinical results have been encouraging. In these patients androsterone and etiocholanolone excretion was essentially eliminated. It was suggested that the administration of cortisone by mouth might possibly effect a bloodless adrenalectomy. The performance of biologic androgen assays on the urinary extracts was not mentioned.

—*John T. Grayhack, M.D.*

Emergencies in Urologic Surgery. THOMAS JOSEPH KIRWIN. *Surg. Clin. N. America*, 1955, 35: 497.

ACUTE URINARY RETENTION, spermatic cord torsion, and conditions involving the kidney, ureter, bladder, and urethra are analyzed mainly for the benefit of the physician whose practice is not limited to urology.

Acute urinary retention with impending extravasation of urine in the periurethral tissues is the most common problem of this group and, when present, it requires immediate decompression. The author regards the use of the "Engel's suprapubic trochar and canula" as the elective decompressive method.

All degrees of renal damage can be found and the intensity of the therapy is usually conditioned by the severity of the trauma, the extent and location of the injuries, and the mechanism by which the damage was produced.

In the absence of shock and profuse hemorrhage, with negative pyelographic evidence of urinary extravasation, careful observation and the administration of fluid, antiseptics and antibiotics may be sufficient measures to achieve recovery. When shock and hemorrhage are the chief manifestations, blood replacement and antishock measures are most important while preparing the patient for exploration. In cases in which a trial of conservative therapy is unsuccessful or deemed inadvisable, emergency exploration is usually undertaken to control any active bleeding and to evacuate collected hematomas. The basic principle of operative repair of kidney lesions is preservation of all viable renal tissue. The Lowsley ribbon-gut method of repair has been proved of value to achieve this goal. In cases in which nephrectomy is unavoidable, evidence of ipsilateral renal integrity is required before the affected kidney is removed.

Ureteral injuries chiefly of traumatic or surgical origin are rare conditions. Different forms of trauma result in tears, punctures, slits, or complete avulsion of the ureter from the kidney. During surgical interventions upon the pelvic organs damage is inflicted by ligation, incision, resection, clamping, and necrosis consecutive to extensive stripping.

Excretory urography is a valuable procedure to determine the involved side in unilateral conditions, and to evaluate the extent of the lesion. It is particularly applicable in cases in which the general condition of the patient precludes the use of cystoscopic examination, and it is not contraindicated in the presence of unconsciousness. It is of little value in cases with reflex anuria or complete avulsion of the ureter from the kidney.

The ureter should be repaired soon after the diagnosis is established, and proper surgical drainage should be instituted to prevent any infectious process.

An end-to-end anastomosis of the ureter is usually feasible in cases in which the loss of substance is minimal. If the lesion is located near the bladder, reimplantation without tension may be preferred. If either program fails or for other reasons is not applicable, ligation of the ureter and delayed nephrectomy are probably the next steps, provided that the other kidney is functionally sufficient. If this is not the case, cutaneous ureterostomy, nephrostomy, or ureterointestinal anastomosis should be performed.

In injuries of the urinary bladder a high index of suspicion is required to make the diagnosis, particularly when severe injuries are associated with shock and hypogastric pain. The presence of an urgent desire to void with the passage of small amounts of bloody urine or no urine at all suggest the possibility of a bladder injury. When catheterization reveals small amounts of urine it is likely that a rupture is present, and if predetermined amounts of a sterile solution are not recovered after they are instilled into the bladder rupture is confirmed. Intravenous urography becomes more valuable if catheterization is impossible. Most lacerations are easily identified on cystoscopic examination with the exception of those occurring at the bladder neck which may pass unnoticed unless edema, swelling, and hemorrhage are present.

Rigidity, abdominal distention, localized tenderness and mass appear only after several hours have elapsed since the time of injury, while nausea, vomit, peritonitis, and sepsis are even later sequelae.

When planning treatment, the relation of the trauma to the peritoneum is taken into consideration as aspiration of any intraperitoneal spillage is advocated at the time the operation is performed. If the condition of the patient permits, the laceration is closed and a double lumen cystostomy tube is inserted to provide suprapubic drainage. If this is not possible, the therapeutic goal is limited to control of the hemorrhage and adequate drainage.

Urethral emergencies caused by direct trauma, foreign body introduced during masturbation or inadvertedly, calculi, and avulsions of the prostatic segment constitute a group of conditions which rarely affect the male urethra. A stone successfully obstructing the urinary flow creates the problem of acute urinary retention. Spontaneous passage may occur, but as a rule suprapubic cystostomy is needed. Manipulation through a urethroscope, with the aid of the Lowsley grasping forceps to remove the stone, may be a satisfactory procedure and perineal incision or suprapubic removal through the cystostomy may not be necessary.

After traumatic avulsions of the prostatic urethra are diagnosed in cases of severe crushing injuries to the pelvis, the need to re-establish urethral continuity is recognized. Suprapubic cystostomy and urethral splinting should be instituted early. Since catheterization is frequently difficult, an ingenious method is described in which a male sound passed through the urethra is engaged to a female sound introduced through the suprapubic wound. This engagement permits introduction of the male sound into the bladder where a soft rubber catheter is attached to be carried through the urethra as the sound is being removed.

The treatment is completed with cystostomy drainage and the usual measures to prevent the formation of strictures.

Torsion of the spermatic cord, which is mostly found in infants and children, offers the problem of a differential diagnosis from epididymitis, orchitis, or strangulated hernia. The characteristic severe testicular pain at the onset disappears after several hours have elapsed, to be replaced by moderate tenderness and swelling of the epididymis. Elevation of the scrotum, increasing the pain present (Prehn's sign), has been found of value in the diagnosis.

Immediate operation is indicated to restore the vascular supply if the organ is to be preserved. The testicle is removed if it is not deemed viable during operation. —*Néstor S. Martinez, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Pathogenesis of Sudeck's Syndrome (Zur Pathogenese des Sudeck-Syndroms). G. SCHLOMKA and H. OPITZ. *Chirurg.* 1955, 26: 55.

THE AUTHOR discusses the etiologic concepts of Sudeck's syndrome and presents the case history of a patient with arsenical polyneuritis in which all four extremities were involved. Concomitantly with motor and sensory paresis, there was involvement of the sympathetic nervous system, consisting of hyperhydrosis, deep and superficial causalgialike pains and swelling, with glossiness of the skin. X-ray films showed marked demineralization of the skeleton, which was especially pronounced in the metaphyseal and epiphysial regions of the long bones, the radius, femur, and tibia. Only three similar cases had previously appeared in the literature. In none of these cases could the etiology be explained on the bases of the theories of Sudeck, Rieder, Charcot, or Mascher.

In contemplating the cases of Sudeck's syndrome which have occurred in patients with brain tumors, hemiplegias, and poliomyelitis, and in reviewing the one case of his own, the author concludes that many different noxae are responsible for the production of this syndrome, provided an abnormal reactive predisposition of the sympathetic nervous system is present. He believes that in this way the wide discrepancy between trauma and symptoms, and the relative increase of Sudeck's syndrome after the war can be explained. —*George Wichman, M.D.*

Skeletal Lesions in Coccidioidomycosis. ROBERT MAZET, JR. *Arch. Surg.*, 1955, 70: 497.

COCCIDIOIDOMYCOSIS is a deep mycotic infection caused by the fungus Coccidioides immitis. The initial or primary phase is usually a self-limited pulmonary infection. After an interval of 2 to 6 weeks lesions may appear in other organs, indicating the onset of the secondary or disseminated phase.

The portal of entry is almost always the respiratory tract. The inhaled chlamydospores rapidly assume the spheroidal form within the host. Clinically and roentgenologically the primary phase of the disease greatly resembles pneumonia with hilar adenopathy, except that it usually clears up in about 3 weeks.

The reaction of the host to coccidioidomycosis is similar to that in tuberculosis except that spherules are encountered. There is first an acute purulent phase in which the inflammatory reaction is primarily leucocytic. This is followed by a chronic granulomatous reaction in which monocytes, epithelial cells, and giant cells are observed. Necrosis and caseation occur.

The diagnosis can be made positively only upon identification of the organisms. Typically there is a history of the patient's having been in an endemic area, the southwestern portion of the United States, perhaps for only a few hours. From 1 week to 4 weeks later symptoms and signs of pulmonary disease develop. Usually the respiratory infection clears spontaneously in a few weeks. During this period the allergic reaction occurs and the skin test becomes positive.

A positive skin test is fairly reliable, but only 6 weeks or longer after infection. A negative skin test early, followed by a positive skin test later is conclusive.

The granulomatous spread may become manifest by the development of abscesses in practically any organ or system. It is usually the soft-tissue abscess, developed by extension from the bone lesion, which calls attention to the osseous infection. Demonstration of the spherules in pus or by biopsy of a lesion establishes the diagnosis. The organisms can be cultured. They may be recovered from gastric washings, sputum, pleural or spinal fluid, and pus.

The roentgen changes observed in bone are not diagnostic. They simulate those seen in tuberculosis, blastomycosis, metastatic carcinoma, and osteomyelitis. No bone or joint is immune from invasion; invasion of a single bone or joint is unusual. There is a predilection for bony prominences—tibial tubercles, malleoli, patella, trochanter, olecranon, and epicondyles. The lesions are primarily destructive. There may be periosteal proliferation with cortical expansion and sclerosis; the cortex may be perforated. Sequestra are observed rarely.

Tuberculosis does not exhibit a predilection for bony prominences, does not often have skin manifestations, and is more frequently found in joints alone, which is unusual in coccidioidomycosis. Tuberculosis generally causes less destruction of juxta-articular bone and of opposing cartilaginous surfaces than coccidioidomycosis.

Since practically any organ of the body may be involved, the clinical course of the disease follows no definite pattern. No specific therapy is known.

—*Kenneth E. Sherman, M.D.*

Is Hernia of the Intervertebral Disc Favored by Pregnancy? A Study of 100 Operations (La hernie discale est-elle favorisée par la grossesse? Étude de 100 cas operés). ANDRÉ SICARD and CLAUDE SUREAU. *Presse méd.*, 1955, 63: 527.

ALTHOUGH it is probable that hernia of the intervertebral disc is favored by some degenerative factor of undetermined pathogenesis it is a fact that the condition is initiated by trauma or, more frequently, by microtrauma. Males, particularly, are most likely to be engaged in work requiring severe physical exertion, and are therefore most frequently affected with hernia of the nucleus pulposus. Females also are involved in this affection with surprising frequency (a third of 1,149 interventions for discal hernia were in females).

In order to study the possibility that pregnancy may have something to do with this unexpected development of discal hernia in women, 100 female patients were chosen from the authors' operative material of the past 4 years and subjected to statistical analysis.

This study disclosed the fact that the number of pregnancies undergone by the individual patient did not show any relationship to the incidence of discal hernia. It seemed evident that pregnancy does not cause any permanent damage to the annulus fibrosus. Of 70 women who had undergone a pregnancy, 30 were primiparas. Of the 70 there were 17 in whom the symptoms of hernia began in the course of the pregnancy itself (in the third month of pregnancy 3; in the eighth month, 2; in the ninth month, 1; during the first week of the puerperium, 2; within the first year following labor, 11.) In the authors' opinion, these figures are sufficient to postulate a relative responsibility for pregnancy in the causation of discal hernia. The figures here given do not comprise all the positive indications for this belief. There is the matter of aggravation of symptoms during the period of a subsequent pregnancy, or even during the menstrual periods in some cases. For further details the interested reader is referred to the original text.

The crux of the matter, lies in the fact that in all these 17 parous women in whom the relationship of pregnancy and the development of discal hernia is considered an established fact, the authors were able to elicit a history of some trauma, such as torsion of the spine, a fall, or merely the contortions incident to a difficult labor, which would explain the instances of the production of such hernias during labor. This relationship has been discussed also by Alagouanine and Thurel (*Rev. Neurol.*, 1945, 11–12: 302).

Although the authors admit the etiologic relationship of pregnancy in the development of discal hernia, they are not willing to go as far as O'Connel in postulating the relationship of discal hernia to the production of the paralyses of pregnancy (*Surg. Gyn. Obst.*, 1944, 79: 374); in none of the present series was there evidence of weakening or paralysis of the muscles of the lower extremities or of disturbances in bladder function. —*John W. Brennan, M.D.*

Ossification of the Vertebra (Beitrag zur Ossifikation der Wirbelsaeule). Eva Schiedt. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 241.

The author attempts to clarify the manner of ossification of the vertebra, particularly the manner of ossification of the vertebral processes, which Prof. Toendury, at the University of Zuerich, Switzerland, has asserted did not consist of enchondral processes, but of perichondral ingrowths of ossification from the periphery.

In fact, the author shows that the ossification of the vertebral process begins as a single center, or plate, of new-formed bone on the inner, or canalward, surface of the process, one on each side, at the junction of the radix arcus vertebra with the arcus vertebra itself, or lamina of the arch. From this point the perichondral bone spreads around the periphery of the process to constitute a veritable cuff with the ossification spreading inward from this structure toward the center to form the spongiosa of the bone. In this manner the process of ossification also extends ventrally to involve the radix to its place of attachment to the corpus, posteriorly to involve the lateral portion of the lamina, and laterally to involve the articular processes.

Thus, at birth the arcus of the embryo is completely ossified with the exception of the spinous process and medial portion of the lamina, the processus transversus, and the articular ends of the articular processes.

In the corpus vertebrae, on the other hand, the process of ossification begins as two ossification centers, one on each side of the notochord. These centers coalesce around the notochord itself and the single (coalesced) center then spreads from the center outward toward the periphery; that is, the process is, in contradistinction to that in the arch, an enchondral one.

The results of these two different moduses are to be seen in the preponderantly spongeous bone formation of the corpus vertebrae, on the one hand, and the preponderantly compact bone formation of the arch on the other. The reason for the peculiar ossifying behavior of the arch is the fact that an enchondral ossification process in the predominantly thin, delicate bony structure of the arch would, in the course of its cartilage bone transformations, result in serious disturbances of continuity during the period of development of this bony portion of the vertebra.

In fact, the peculiar oblique dehiscence, or cleft, in the interarticular plate of the arch which is characteristic of the anomaly of spondylolysis and results in the well known nosologic entity of spondylolisthesis, has been ascribed in the past to a failure of coalescence of a double (hypothetical) enchondral ossification center. However, on the basis of this study, it will be necessary to place the formation of this cleft at a much earlier period of embryonic development.

—*John W. Brennan, M.D.*

Spondylolisthesis. E. W. O. Adkins. *J. Bone Surg.*, 1955, 37-B: 48.

Forty-six cases of spondylolisthesis were studied for this paper, which was judged *proxime accessit* in the Robert Jones prize competition for 1953. The symptoms of this entity comprise two main groups: back pain and leg pain. The back pain is easily explained by the unstable architecture of the lumbar part of the spinal column. The problem of leg pain is not so easily explained, but this type of pain probably is produced by irritation, rather than actual compression, of nerve roots. The author believes that actual interference with the nerve root occurs in the presence of this entity, so that irritative phenomena are thus set up.

Careful exploration of the affected segments was carried out at the time of operation on all 46 patients. The looseness of the affected lamina was striking. In many cases pseudarthrosis of the pars interarticularis was of considerable extent, composed often of bulging fibrous tissue, and so situated as partially to block the intervertebral foramen. The nerve root was found to be in immediate anterior relationship to this mass, and often closely adherent to it. In many cases gross scarring of the disc was evident, and some degree of distortion of the dura was common, but usually was not considered to be productive of symptoms. Although distorted, the intervertebral foramen generally was enlarged, and its size was finally dependent on the mass of fibrous tissue associated with the pseudarthrosis, the scarring of the disc, and the presence

or absence of an osteophytic ledge coincident to this scarring.

Although compression of nerve roots did not occur in this series, the author believes that these symptoms could be caused by the laminal pseudarthrosis, narrowing of the neural groove caused by scarring of the disc, and forward-displaced facets in cases in which true laminal defects are absent. None of the author's patients had associated prolapse of an intervertebral disc, but tuberculous involvement of the spinal column was recognized in two cases. Evidence of compression of the cauda equina was not seen in this series.

So far as causation is concerned, the author believes that spondylolisthesis is a developmental defect, although it may be modified by trauma and acquired change.

The author recommends surgical treatment of this lesion if symptoms warrant. In the performance of such an operation he emphasizes the need for adequate exploration of the defect, removal of the loose lamina and its facets, and adequate decompression of nerve roots. After this, posterior spinal fusion should be done. As a consequence of the present analysis of these cases, the author states he has begun to include posterior rhizotomy in the surgical treatment. He admits this is a recent change, and one that he cannot validate until more time has elapsed.

—E. W. Johnson, Jr. M.D.

The Differential Diagnosis of Osteochondritis of the Hip (In tema di diagnosi differenziale dell'osteocondrite dell'anca). RENATO MASTROMARINO. *Ortop. traumat. app. motore*, 1955, 23: 35.

THREE CASES of hip joint disease are reported in which the differential diagnosis, particularly from osteochondritis and osteoarthritis, proved difficult or impossible.

The first case was that of a 5 year old child who had been suffering for approximately a year from pains in the right hip joint. The roentgenological picture was compatible with that of osteochondritis. The limb was put in a cast and the clinical and roentgenological findings were without essential change for about 5 months. Then severe pain and febrile attacks occurred and the roentgenological picture became that of a typical osteoarthritis.

The second case was that of a 16 year old patient who had been suffering for approximately 6 months from pain and claudication which was referred to the left hip. There was a history of typhoid fever at 13 years of age and a pleuritis of unspecified nature during the period of convalescence. The joint felt hot and the rate of sedimentation was somewhat accelerated. The roentgen examination disclosed a somewhat widened articular fissure and some irregularity of the upper acetabular margin. The initial diagnosis was tentatively an osteochondritis and stratigraphy seemed to confirm the diagnosis with the uncovering of a stalactitelike appearance of the roof of the acetabulum. The limb was placed in a cast and slight continuous improvement occurred during the next 12 months. The roentgenogram also demonstrated some reparation of the described changes. The cast was removed and the patient was permitted to walk about. Five months after this, violent pains in the affected hip required bed rest. The absence of weight bearing brought improvement in the painful condition, the clinical picture remaining much the same with little evidence of articular disturbance; however, the roentgenogram presented at this time the typical disappearance of the articular cleft and the osteolytic lesions of an osteoarthritic process in the femoral head.

The third instance was that of a 6 year old child who had been suffering for approximately 2 months from pain in the left hip region and was limping. The rate of sedimentation was up slightly and the intradermal reaction for tuberculosis was positive after 24 hours; however, the roentgenogram was negative and the patient was put to bed for 15 days. At this time all symptoms had disappeared. A year later the pains returned, there were some febrile attacks, and the joint was diffusely swollen with an increased local temperature. The diagnosis of an osteoarthritis seemed more than justified by the clinical and roentgenographic findings at this time and antibiotics were initiated. This treatment and immobilization in a cast was carried on for some 6 months. After this time all symptoms had disappeared and the joint was almost completely mobile. The roentgenogram at this time, however, still disclosed some eburnation of the bony structures of the joint and some irregularity of the osseous profiles, but the irregularities were evidently in the process of repair. The author cites this case as either an instance of osteochondritis, or of osteoarthritis with its course modified by the antibiotic therapy. Not excluded, of course, is a genuine case of Perthes' disease.

The author believes that all attempts at therapy should be subordinated to the procurement of a definite diagnosis. Only the determination of the nature of the clinical and roentgenographic picture will assure a reliable prognosis and adequate therapy.

—John W. Brennan, M.D.

Osteoarthritis of the Hip; a Study of the Clinical Pathology. G. C. LLOYD-ROBERTS. *J. Bone Surg.*, 1955, 37-B: 8.

THIS ARTICLE is an abstract of the Robert Jones prize essay for 1953. The author investigated the morbid anatomy and the causation of osteoarthritis of the hip in an extremely scientific and scholarly manner.

He advances the theory that only the capsule of the hip joint is responsible for the pain which occurs in this clinical entity. This conclusion has been reached on the basis of the synovial congestion, subsynovial and capsular fibrosis, and resultant shortening of the capsule. It is postulated that the ability of the synovium to pick up and remove articular debris may also serve to promote these microscopic responses to joint degeneration. Accompanying these changes are reflex muscle spasm and guarding, with consequent limitation of motion.

The skeletal changes in osteoarthritis of the hip joint were studied by analysis of 35 operative specimens. It was found that the articular cartilage shows the earliest change in joint degeneration, and that the greatest loss is found in the "pressure area," the upper quadrant of the femoral head which is in contact with the acetabulum in moderate ranges of movement. What happens in early stages of this degeneration is

in doubt, but later changes show fragmentation, an increased fibrillar pattern, and loss of chondrocytes. Detachment of particles of degenerated cartilage causes synovial irritation, followed by hyperplasia and fibrosis. Subsequently, the subchondral sclerosis seen in roentgenograms develops. However, the subchondral bone participates in the process, and the sclerosis of this layer eventually penetrates into the substance of the femoral head. This invasion causes flattening of the head and loss of its normal spherical contour, with a subsequent tendency toward subluxation.

In examination of the specimens, cysts of the bone were seen in every one, in the area in which the cartilage had suffered the most. The author believes that these cysts arise because of failure of the remodeling process, so that osteoclasis outstrips osteoblastic activity in certain areas. The author believes these cysts are clinically significant in that they usually indicate painful osteoarthritis, and they occur only when degeneration is advanced.

The presence of a ridge of new bone on the under surface of the femoral neck, as described by Wibery, also was studied. The presence of this ridge indicated that capsular fibrosis and adhesions were present, since it is thought the ridge is caused by the formation of new bone within a subperiosteal space produced by traction transmitted through the fibrotic capsule to the periosteum investing the neck. The ridge was found in more than half of 82 hips studied, and it always seemed to be associated with increased disability and adduction deformity.

Clinically, the osteophytes frequently seen were thought to be of far less importance than their frequency would indicate. They are said to originate either by extension of bone into degenerate articular cartilage or by synovial metaplasia. It is possible that these osteophytes encourage synovial hyperplasia and thus contribute to capsular fibrosis, but it is probably closer to actual fact to conclude that their main purpose is to indicate the age of the whole degenerative process.

The second half of this article is involved with a study of the causes of osteoarthritis of the hip. The causes as listed by the author have four definite categories:

1. Incongruity between the articular surfaces of the femoral head and the acetabulum (12.1% in this series).
2. Dysplasia of the hip.
3. Insidious ischemia.
4. Idiopathy.

In the author's series, osteoarthritis of the hip was of known causation in 41.2 per cent of the cases; in 58.8 per cent it was of "unknown" causation.

—*E. W. Johnson, Jr., M.D.*

Osteochondritis of the Acetabulum (L'osteocondrite acetabolare). Giorgio Monticelli and Riccardo Tucci. *Ortop. traumat. app. motore*, 1955, 23: 3.

The long dispute with reference to the nature and origin of osteochondritis of the acetabulum and its relationship to Perthes' disease (coxa plana) seems to have been adequately covered by Lipscomb and Chatterton (*J. Bone Surg.*, 1942, 24: 372). These writers even called attention to the two different groups of ossification centers (primary and secondary) which are involved in the development of the acetabulum, without, however, adequately indicating their role in the disturbances of ossification which go under the name of osteochondritis. This role, the authors believe, is extremely important and therefore especial attention has been given to these structures with regard to osteochondritis of the acetabulum.

Some authors have claimed that there is an asymptomatic form of osteochondritis of the acetabulum, and it would be easy to diagnose as osteochondritis what is merely a variation of the normal process of ossification.

On the basis of roentgenographic findings, coupled with the clinical history of the malady, the authors are able to distinguish two different forms of osteochondritis of the acetabulum. The first form which they distinguish is a comparatively mild process, occurring in children, usually between the twelfth and fifteenth years of age. Since the secondary centers of ossifications appear only during the ninth year of life, the authors hypothesize and believe that they have more or less demonstrated, roentgenographically, the cause of the acetabular osteochondritic process to be connected with disturbances of ossification in these secondary centers. They point out, of course, that the primary centers may eventually become involved to some extent.

In this group the clinical findings consisted generally of vague pains located in the region of the hip joint, without apparent cause. There was usually a fleeting lameness in the affected limb and a certain amount of limitation of motion, particularly in abduction and internal rotation. There was usually a certain amount to pressure pain over the articulation. Roentgenologically there was the clear picture of osteochondritis, such as is commonly encountered with the same process in other locations of the body. Roentgenologically, there could also be demonstrated a reconstitution of the centers and indeed of the joint structure with proper treatment (no weight bearing for periods up to a year).

The second form developed much earlier in life, was of graver import, and was ascribed by the authors to disturbances of ossification in the primary centers, that is, those primary centers which are present at birth and arise as ossifying processes in those portions of the three bones of the pelvis (os ilium, os ischium and os pubis) which form the floor of the acetabulum. Since in these children the symptoms habitually arose, without any previous history of symptoms, long after the child had been walking normally, the authors do not believe that the condition has any congenital basis.

Only for a few months had the 7 or 8 year old child begun to experience pains in the hip joint, claudication, limitation of motion, and some pain on pressure over the joint. The roentgenologic examination usually disclosed an osteochondritic disturbance of the three primary centers of ossification mentioned. Characteristic of this form was the tendency toward the development of a subluxation, upward and backward, occurring rather late in the course of the disease; however, in this form, also, the response tends to be good if the patient is brought under the proper treatment early enough.

On the whole, the treatment for both forms is considered to be the simple annulment of the weight bearing function of the limb, coupled (if the muscular contraction seems to indicate it) with a myotenotomy of the adductor muscles and perhaps a denervation of the anterior articulation.

—John W. Brennan, M.D.

A Case of Endothelial Sarcoma of the Femur, of the Type of Ewing's Angioendothelioma (A propos d'un cas de sarcome endothélial du fémur du type angio-endothéliome d' Ewing). R. FONTAINE, P. WARTER, J. N. MULLER, and F. SCHULER. *Rev. chir.* Par., 1954, 73: 270.

THE AUTHORS describe the case history of a male patient who, at the age of 45 years, noticed the appearance of small painless subcutaneous tumors at the right forearm. Six years later a similar tumor mass appeared in the right axillary region. Seven years later, after a fall, the patient fractured his right femur. This fracture united in 3 months. Within the next one and one-half years the patient twice suffered fractures of the same femur. The last fracture healed with a malunion.

He was admitted to the hospital with a large mass in the right femur, and his general condition was poor. The roentgen picture showed a multicystic appearance of the femur and right pelvis, with signs of malignancy. Metastases were found in the skull and in the sixth dorsal vertebra, but not in the lungs. The blood levels of calcium phosphorus and phosphatases were normal.

A biopsy of the femoral lesion showed a "reticular sarcoma but with endothelial evolution." Later, another biopsy was taken from one of the small tumors of the forearm, which showed greater polymorphism, and a diagnosis of "endothelial sarcoma" was made.

After deep x-ray therapy, the condition of the patient improved for a period of 2 years. The patient died of multiple metastases.

This case is reported for three reasons: (1) the first signs of the tumor appeared as small subcutaneous nodules in the forearm (7 years before the fracture of the femur); (2) the unusual x-ray appearance of the lesions; and (3) to stress the point that under the name of Ewing's sarcoma, many varieties of tumors are described. *—Joseph C. Mulier, M.D.*

Therapeutic Problems in the Knee Paralyzed by Poliomyelitis (Problemi terapeutici nel ginocchio paralitico da poliomielite). DANTE COSTANZO and NICCOLO' PANCINO. *Ortop. traumat. app. motore*, 1955, 23: 139.

THE RESULTS of treatment of 284 polio cases at the Orthopedic Clinic of the University of Rome, Italy are here reported.

The better results seemed to be attainable with the more massive types of transplantation. But little more than this can be said, because of the enormous variety and grades of the conditions encountered. On the whole, the authors are of the opinion that the best results will be obtained under conditions in which the most precise diagnosis is made and the procedures adopted which most closely apply to the individual case are adopted. In general, good results were procured with the muscle transplantation methods, if not in the functionally active, at least in the static sense.

In these tendon transplantation operations the authors particularly emphasize the fact that the reeducation of the transplanted muscles was more complete and rapid when the muscle transplanted was originally more strictly antagonistic in its function to that of the muscle for which it was substituted.

Arthrodeses were done in a total of 77 patients. This operation was not done exclusively on flail joints, that is, joints in which no vestige of muscle function to the joint operated upon remains, but also, perhaps more frequently, in those instances in which the residual pull would without arthrodesis eventually lead to severe deformities.

Osteotomy was performed in 62 instances: 30 times for genu valgum, twice for flexion contracture, 14 times for valgum and flexion, 6 times for genu valgum and external rotation, 4 times for valgum, flexion, and external rotation, 5 times for genu valgum in the tibia, and once for valgum in both the tibia and femur. The results of the osteotomy operation were with reference to consolidation and correction, excellent in every instance. The one inconvenience, that is, the slipping of the fragments, has been practically obviated by the operation of a trochlea-shaped osteotomy, which was perfected by the authors' superior, Carlo Marino-Zuco.

Osteotomy of the flexors and posterior capsulotomy were done in a few severe conditions of contracture of the flexors; however, for the less severe instances the authors have preferred the correction of the contracture by means of a progressive cutting away of the cast. Of course, in pronounced osseous deformities an osteotomy had to be added.

In instances of flail joint, in which abduction of the limb was impossible, the arthrodesis of the knee joint would, of course, not correct the weaving gait and the tendency to fall to the affected side. The authors preferred to do an arthrodesis of the hip joint, in mild extension, associated when necessary with a triple arthrodesis of the joints of the ankle and foot. This method assures a recurved knee joint and a fairly free gait in walking.

Finally, there are a few remarks with reference to orthopedic braces. Of course, the type of brace must be adapted to the individual condition encountered. However, this much may be generally predicated: the brace is merely a sustentative, not a corrective procedure. Thus, in those cases in which corrective surgery seemed indicated it was always done before the brace was finally applied. In some instances the most that can be expected from the operative procedure is the possibility of walking with the aid of a brace.

—John W. Brennan, M.D.

X-ray Appearance and Interpretation of Bony Lesions Which Occur in the Metaphysis of the Tibia and Femur (Roentgenbild und Deutung bestimmter Knochenherde in den Metaphysen von Tibia und Femur). A. RAVELLI. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1955, 280: 205.

THE AUTHOR reports 31 cases in which a nonossifying fibromalike lesion was found in the long bones. In most of the cases it was asymptomatic and discovered

by accident. Seven of these lesions were present in the distal tibial metaphysis, 2 occurred bilaterally, 11 were found in the proximal tibial metaphysis, 8 in the distal femoral metaphysis, and 2 in the femoral neck.

From this series it is apparent that the incidence is slightly higher in the fast-growing epiphysis. In each bone the lesions were found in typical locations. In the distal tibia they were posterior and lateral, in the proximal tibia they were posterior and medial, and in the distal femur the medial and posterior aspects were involved. In 2 cases involving the femoral neck, the lesions were located in the anterior angle. The average age of the patients was 25 years, the youngest patient was 5 and the oldest 55 years old. The male to female ratio was 21 to 5.

The lesions in the distal tibia were located within the cortex and showed expansile growth. The edges were composed of slightly sclerotic bone, the inside contained cystlike, round or ovoid areas which were rarefied and separated from each other by thin bony specules. They were arranged in grapelike fashion. The lesions in fast-growing epiphyses had an elongated appearance with similar cystic areas which were arranged in chains. If they appeared externally in the cortex, the expansion occurred toward the surface in many instances, however, expansion toward the spongiosa was present.

In discussing the etiology the author agrees with Konjetzny and believes that the lesions represent a resorptive, regenerative process of pathologically altered bony foci. He thinks that they are related to normal epiphysial growth. He also points out that similar lesions are seen in Legg-Perthes disease and can be explained on a similar basis. He agrees with Hatcher that disturbance of perichondral ossification on vascular bases, somewhat similar to that which is seen in osteochondritis dissecans, is of etiological importance.

In reviewing the literature he points out differences that exist in the terminology of this lesion. Sontag and Pyle call them "cystlike areas," Jaffe and Lichtenstein call them "nonosteogenic fibroma," and Hatcher calls them "metaphysial fibrous defects." Since these lesions resemble giant cell tumor histologically but cannot be classified as neoplasms, the author suggests that the term "giant cell granuloma" is most appropriate.

Case histories and roentgenographs are included.

—George Wichman, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Anatomic Pitfalls in the Surgical Treatment of Torticollis. EMANUEL B. KAPLAN. *Bull. Hosp. Joint Dis.*, N. Y., 1954, 15: 154.

A STUDY was made to describe the limited number of variations of the muscles inserted into the clavicle. The variations of the venous system in this same area were also studied and the abnormalities noted. The platysma, sternocleidomastoid, trapezius, omohyoid, and scaleni muscles are responsible for most of the contraction called torticollis.

Blind tenotomies are actually dangerous according to this study. The arterial system in this region was found to be normal within reasonable limitations. Special factors are discussed to warn the worker of the complications associated with surgery and to prevent surgery in special cases.

—Richard J. Bennett Jr., M.D.

Late Results of Partial Meniscectomy in 82 Cases (Spaetergebnisse nach partieller Meniscusresektion bei 82 Faellen). RUDOLF STRELI. *Chirurg*, 1955, 26: 97.

THE AUTHOR reviews the late results of 82 meniscectomies performed at the Unfallkrankenhaus, Vienna, 18 to 25 years ago. Seventy-one patients had medial partial meniscectomy, 10 had lateral meniscectomy, and in one case both menisci were removed. Seventy-two specimens were preserved in alcohol and are now available for study. The average age at the time of operation was 30 years. There were 35 complete, 23 incomplete tears, 5 transverse, and 11 comma-shaped tears.

Results of examination of the specimens were divided into four groups, viz.: group 1, excellent; group 2, good; group 3, fair; group 4, poor.

In 68 cases the results were classified as excellent, with a full range of motion, no muscular atrophy, and good stability. In 52 cases no changes which could be attributed to previous meniscectomy were demonstrable roentgenologically. In 10 cases there were minimal changes which were considered to be related to operation. Twenty cases in this series were graded as good. In most of these cases a history of trauma or other soft tissues around the knee could be elicited. Generally the duration of symptoms was longer in patients with good operative results than in those with excellent results; 17 of 20 patients in this group were overweight, 3 showed sensory disturbances due to severance of an infrapatellar ramus or saphenous nerve; 11 had full range of motion; 6 showed 5° of limitation of extension; and 5 other patients showed limitation of flexion. In 9 cases of this group instability was present prior to operation, which greatly impaired the prognosis. In comma-shaped tears, a greater incidence of cartilaginous erosion was observed, especially when surgery was delayed. Two patients had osteochondritis dissecans and both developed osteoarthritis. In 3 other patients a history of severe knee injury after the operation was reported, which also impaired evaluation of the end results.

In group 3, there was only one case in which the results could be considered as poor. This patient sustained a severe injury to the knee after the original operation. On examination, marked instability of the medial collateral ligament and atrophy of the thigh and calf muscles were observed. The Draver sign was also positive.

The author reviews the literature on this subject and discusses the difference between the cases in which the meniscus was removed completely and his own cases in which only partial meniscectomy was done. He points out that in all cases in which knees were normal prior to operation, and in which only the meniscus was involved, the overall results were excellent. In 69 cases (51%) no changes were shown on x-ray examination; in 15 (87%) there were changes present which consisted of rounding of the tibial plateau angle and spurring; in 14 (62%) there were

changes consistent with the presence of degenerative arthritis. On the basis of his studies of these cases, the author concludes that partial resection of the meniscus, as has been advocated by Böhler, is the treatment of choice. —*George Wichman, M.D.*

FRACTURES AND DISLOCATIONS

Sudeck's Syndrome After Fractures (Ueber das Sudecksche Syndrom nach Frakturen). G. BIERLING and D. REISCH. *Fortsch. Roentgenstrahl*, 1955, 82: 1.

THE AUTHORS review 3,170 cases of simple fractures. Sudeck's syndrome was present in 587 cases, or about 18 per cent. In comparison with other statistics before the war, this percentage indicates a slight increase in incidence of the syndrome in recent years. It appeared twice as frequently in the lower extremity as in the upper, and, in the authors' opinion, this was due to a slight predisposition of the lower extremities to circulatory congestion. The dystrophy appeared first in the distal fragment, then in the distal adjacent bones; in many cases it extended proximally. Involvement of the patella was present in many cases. Among 37 patients with fractures of the calcaneus, Sudeck's syndrome developed in 24. The greatest incidence was noted in patients under 25 years of age and over 50 years. Women in the climacterium showed an increased incidence which was believed to be due to the hormonal imbalance during this stage of life. In 5 cases in which fractures occurred in the same locations bilaterally, a difference in the severity of Sudeck's dystrophy on the two sides was found. This tends to exclude the importance of the theory of endogenous predisposition, described in the literature. Of 587 patients with Sudeck's syndrome, 108 had severe involvement. This again was especially pronounced in women during the climacterium.

On x-ray examination a distinction was made between the diffuse, spotty, streaked subchondral and metaphysial reactions. The diffuse form appears in the first decade of life and has a benign course. In radial and malleolar fractures, shredlike rarefaction is present within the metaphysis and the subchondral areas. In fractures of the shafts of the long bones, the moth-eaten appearance of the cortex may be mistaken for osteomyelitis or tumor.

The classification of the syndrome in stages, from the roentgenograms, is extremely difficult. Large spotted involvement of bone runs a protracted course.

From a study of series of cases, Sudeck's syndrome is believed to be a definite pathologic entity, even in the first stage. In the treatment, sympathetic ganglion block, radiation, and hormonal therapy have been used successfully. —*George Wichman, M.D.*

Whiplash Injury of the Lumbar Neural Arch. HENRY MILCH. *Bull. Hosp. Joint Dis.*, N. Y., 1954, 15: 163.

THIS TYPE OF INJURY, it is said, could result in damage not only to the vertebral column, but also to the intervertebral discs, soft tissues, and adjacent nerve structures. These lesions have been discussed earlier in the cervical and dorsal spine. Similar lesions may occur in the lumbar spine.

A case report is presented in which the fourth and fifth lumbar vertebrae were injured. A second case is presented in which a defect was seen in the cervical vertebrae. A true fracture of the neural arch may occur through the laminae or pedicles and when ununited may simulate fractures and congenital defects. Here, the true diagnosis must be made by progressive roentgenograms. —*Richard J. Bennett Jr., M.D.*

FIG. 1 (Connell, Dyson). Initial roentgenograms.

Dislocation of the Carpal Scaphoid; Report of a Case. M. C. CONNELL and R. P. DYSON. *J. Bone Surg.*, 1955, 37-B: 252.

THE AUTHORS describe a case of dislocation of the carpal scaphoid. Their review of the literature indicates that these dislocations have usually been caused by injury while the hand was gripping something in ulnar deviation and dorsal extension of the wrist. They state that the force is transmitted up the second and third metacarpals through the capitate to the scaphoid. If the head is not in ulnar deviation the sudden dorsiflexion that takes place results in the more common transcarpal retroulnar dislocation of the capitate with a fracture or dislocation of the scaphoid.

The most essential element of treatment is early recognition, and in most cases it has been possible to reduce the dislocation by direct pressure over the scaphoid while traction was applied to the fingers with the wrist extended. Open reduction has been necessary in cases which have been recognized late, and usually it is difficult. Some long-standing cases required arthrodesis or excision of the scaphoid.
—*Norman J. Rosenberg, M.D.*

Dislocation of the Fifth Carpometacarpal Joint. H. R. KER. *J. Bone Surg.*, 1955, 37-B: 254.

THE AUTHOR describes an isolated dislocation of the fifth carpometacarpal joint and draws an interesting analogy between this condition and a similar dislocation of the first carpometacarpal joint often associated with Bennett's fracture. The deformity in most cases is maintained by muscle pull and, in the case described, the flexor carpiulnaris acting through the carpometacarpal ligaments prevents restoration of normal position. When the dislocation is in the anterolateral plane across the palmar surface, open reduction has been necessary in all of the 4 cases which have been previously reported.

All of the previously reported cases and the case reported by the author occurred as a result of a direct blow on the ulnar surface of the hand. The marked

FIG. 1. (Ker). Initial roentgenograph.

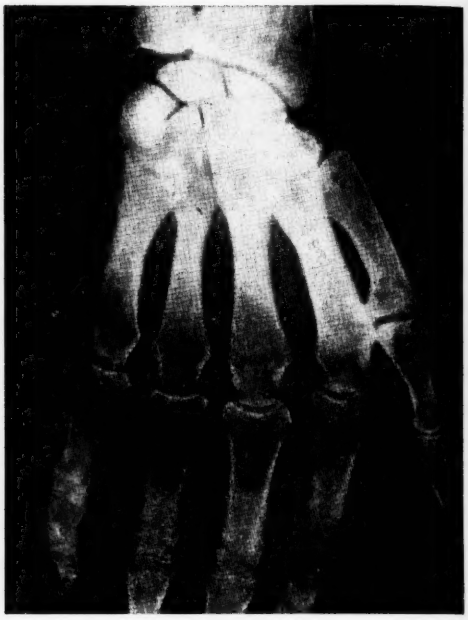


FIG. 2. Six weeks later.

swelling, which occurs early, masks the presence of the metacarpal base in the palm and its absence from the hypothenar eminence. In semiflexion the little finger appeared only to be slightly abducted and the author believes this accounts for the delayed diagnosis in all of the previously reported cases. However, when the finger was completely flexed it was found to point not at the tubercle of the scaphoid, as is usual, but toward the distal end of the metacarpal of the thumb. At open reduction it was necessary through a dorsal incision to lever the displaced bone into place, and because it was unstable it was sutured in place through drill holes. Immobilization was maintained for approximately 6 weeks, following which active motion of the fingers was encouraged and in an additional month the function had returned to normal.

The author concludes that early open reduction with reconstruction of the ligaments is the treatment of choice, and that if reduction is undertaken late and the joint surfaces have been damaged, arthrodesis is indicated to prevent persistent pain and weakness.

—*Norman J. Rosenberg, M.D.*

SURGERY OF BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

The Clinical Value of Angiocardiography. ROBERT H. GOETZ, MAURICE NELLEN, VELVA SCHRIRE, and LOUIS VOGELPOEL. *Angiology*, 1955, 6: 63.

WITH RECENT ADVANCES in cardiac surgery, the exact diagnosis of congenital cardiac anomalies has become of practical importance since it carries with it the implication of surgical intervention. It is therefore essential to determine the exact nature of the abnormality so as to decide whether the particular case is amenable to surgical treatment or not. Within recent years exact anatomical diagnosis in congenital heart disease has received a great impetus from two special methods of investigation—angiocardiography and cardiac catheterization. It is the purpose of the authors to analyze the clinical value of angiocardiography by evaluating the authors' material on 227 cases. Cardiac catheterization is referred to only when the results of such investigations are essential in order to elucidate a particular point in question.

The mode of injection of the dye, the aim of which is to obtain a "bolus effect," will depend on whether it is more important to fill the right or left heart, the whole heart, or the great vessels. Three procedures have been used: (1) prograde intravenous angiocardiography, (2) selective intracardiac angiocardiography, and (3) retrograde aortography.

Angiocardiography has been of great assistance in making possible the exact diagnosis of congenital heart diseases, particularly in the cyanosed group. Congenital abnormalities are generally multiple, and the heart is no exception. Special investigations may reveal abnormalities in addition to those already detected clinically. The additional information may therefore throw a completely different light on the case and may alter the entire therapeutic approach to the problem. Among the conditions in the acyanotic group which are discussed are coarctation of the aorta, patent ductus arteriosis, double superior vena cava and other venous abnormalities, aberrant pulmonary venous drainage, idiopathic pulmonary artery dilatation, congenital aneurysms, septal defects with left to right shunt, and isolated pulmonary stenosis.

Cyanotic heart diseases are the most important and most common of the congenital cardiac abnormalities, some of which are amenable to surgery. Thus, the exact preoperative diagnosis is of considerable importance. The differentiation between pulmonary stenosis with intact ventricular septum and reversed atrial shunt, and pulmonary stenosis with ventricular septal defect (tetralogy of Fallot) is clinically not always easy, and yet it is of great importance because the treatment of the two conditions is different. Among the conditions discussed are severe pulmonary stenosis with right to left ventricular shunt, severe pulmonary stenosis with right to left atrial shunt, truncus arteriosus and pulmonary atresia, pulmonary hypertension causing central cyanosis, transposition of the great vessels, tricuspid atresia, pulmonary arteriovenous fistula, Ebstein's abnormality, and single ventricle-cor triloculare.

Angiocardiography has been less helpful in acquired than in congenital heart disease. Systemic hypertension produces dilatation of the aorta while arteriosclerosis is characterized by an elongation of the large vessels, particularly of the aorta. Steinberg has shown that angiocardiography is of great value in the detection of uncomplicated syphilitic aortitis. Dilatation of the ascending aorta of 40 mm. in caliber is rarely ever due to arteriosclerosis alone. Angiocardiography has very little place in the diagnosis of mitral valve disease, since this method is capable of detecting only gross degrees of mitral stenosis and mitral incompetence. It is often difficult to differentiate between cardiac enlargement and pericardial effusion, both by clinical and x-ray examinations. This problem frequently arises, especially in South Africa where—in the Bantu—myocardial failure of unknown origin produces gross dilatation of the heart and a clinical picture often indistinguishable from massive pericardial effusion. This can be detected by the use of angiocardiography.

Angiocardiography has many applications with respect to the planning of a surgical attack on mediastinal and pulmonary lesions. The diagnosis of such lesions as pericardial cysts, dermoid cysts, and bronchogenic cysts has been assisted at times by angiocardiography. The differential diagnosis between an aneurysm of the aorta or one of its branches and a mass in the upper mediastinum may be greatly aided by an angiocardiogram. The authors believe that an angiocardiogram is helpful in the differential diagnosis between pulmonary and mediastinal tumors. With tumors in the pulmonary parenchyma, selective angiocardiography with the catheter in the respective branches of the pulmonary artery will be of the greatest value and will more often assist the diagnosis than the less well defined prograde intravenous angiocardiogram. Dotter *et al.* have tentatively put forth the following criteria for inoperability:

1. Partial or complete occlusion of the left pulmonary artery within 1.5 cm. of its origin. Partial or complete occlusion of the right pulmonary artery by the tumor proximal to its point of bifurcation.

2. Partial or complete occlusion of the great mediastinal veins or evidence of intraluminal growth in the superior vena cava.

3. Demonstration of mediastinal metastases displacing or deforming adjacent vascular structures which reveals mediastinal spread.

4. Pericardial invasion by tumor as judged by localized thickening of the pericardium in the absence of disease of the pleura and pericardium.

The reader is referred to this excellent article of 51 pages which describes the various techniques employed in the differential diagnosis of the various conditions. This is accompanied by excellent reproductions of roentgenograms of the various types of lesions discussed. —*LeRoy J. Kleinsasser, M.D.*

Angiopathies in Acrosclerosis. ROWLAND J. CALVERT, SYDNEY G. NARDELL, and CYRIL RAEBURN. *Angiology*, 1955, 6: 129.

THE CLINICAL DISTINCTION between acrosclerosis and diffuse progressive scleroderma, although arbitrary, is nevertheless convenient. Acrosclerosis is almost invariably accompanied, and usually preceded, by the Raynaud phenomenon, and occurs typically in adult women as a slowly progressive disorder. Although sclerodactylia, with vasomotor, tropic, and even ulcerative peripheral changes, predominates, other varying accompaniments include facial sclerosis, dysphagia, and widespread visceral involvement. An illustrative case is reported with calcinosis (Thibierge-Weissenbach syndrome), in which there was also occlusion of certain large-calibered arteries, a feature which has not previously received clinical study. Arteriography revealed occlusion of the right femoral and left posterior arteries, a feature not previously emphasized, and one warranting further study. Gangrene and profound ulceration of the foot compelled amputation of the right leg, thus permitting its detailed histological study. It was shown that the sclerodermatous process had involved the skin, vessels, and nerves as well as all of the collagenous tissue of the limb, thus further emphasizing the widespread tissue involvement in this case.

The treatment of scleroderma has never been standardized. Results have been capricious or futile. Despite the evaluation of a wide variety of drugs, none has been convincingly demonstrated to influence established dermatosclerosis, Raynaud's phenomenon, or calcinosis. The advent of cortisone and ACTH have not modified this view although in the early phase of the disease either drug may produce a remission, but no significant increase in the peripheral circulation or skin temperature. The results of thoracocervical or lumbar sympathectomy for the relief of acrosclerotic peripheral ischemia and dermatosclerosis has proved disappointing or conflicting. The value of peripheral vasodilator drugs is refuted. The authors felt that their patient, who had advanced acrosclerosis with occlusion of certain large arteries, bilateral ulceration of the skin of the legs, and gangrene of the right foot, was clearly an unsuitable candidate for sympathectomy and was unlikely to benefit from vasodilator drugs.

Ulceration of the legs is not uncommon in acrosclerosis, and the relative contributory roles of peripheral vascular insufficiency and local dermatosclerosis remain speculative.

—LeRoy J. Kleinsasser, M.D.

BLOOD; TRANSFUSION

Studies on Stored Blood and Its Relationship to Its Biologic Properties, and the Indications for Transfusion of Whole Blood (Comportamento del sangue stabilizzato e conservato: studio delle sue modificazioni in rapporto alle proprietà biologiche e alle indicazioni cliniche della trasfusione). G. F. DELLA PENNA, E. NATALINI, M. MANCUSO, and G. DEL GRANDE. *Ann. ital. chir.*, 1955, 32: 130.

THE MORE RECENT LITERATURE on the problems of blood preservation, storage, and transfusion is reviewed and data are presented to show what happens to whole human blood during storage.

Because of the rapid hemolysis and fall in the red cell mass on storage, the author feels that blood should be administered within 6 days of its collection. Graphs are presented which show that during the storage of blood there is within 7 days an appreciable increase in the cellular fragility, free hemoglobin, a decrease in the oxygen content, and a diminution of white cells and platelets. There is an increase in the total proteins with a rise in the albumin fraction and a fall in globulin. The sodium content falls, as is well known, and the potassium content rises. The use of blood older than 10 days is strongly condemned.

—Alexander J. Conte, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

The Value of Sterile Honey Sugar Solutions in Surgery (Ueber die Verwendbarkeit steriler Honigzuckerloesungen in der Chirurgie). WOLFGANG CAITHAML. *Muench. med. Wschr.*, 1955, 97: 591.

THE AUTHOR, of the Surgical Department of the University of Graz, Austria, discusses the advantages of intravenous infusion of honey solutions over glucose. Honey contains about equal amounts of glucose and fructose. Fructose is superior to glucose in several respects: (1) dissimilation of fructose takes place faster and more completely than that of glucose; (2) the blood sugar rises less and returns to the original level more rapidly after fructose than after glucose; (3) the specific dynamic effect, i.e., the increase of oxygen consumption over the basal metabolic rate is higher in fructose (+7 per cent) than in glucose (+4.5 per cent); and (4) glucose is stored mostly in the muscles, fructose in the liver. The more the blood sugar rises during the infusion the poorer is its utilization in the metabolism. The lowering of the blood sugar level during the infusion is caused by surpassing utilization.

When honey solutions are infused the blood sugar level drops during the infusion, and it takes considerable time before it returns to the original level. The author concludes that honey contains a specific agent with an insulinlike effect. It has been shown in animal experiments that infusion of acetylcholine causes lowering of the blood sugar with decreased oxygen consumption and increased assimilation of sugar. A cholinergic factor was proved to be present in honey, which probably is instrumental in lowering the blood sugar during and after honey infusion. This is of special importance in the preoperative postoperative management of diabetics. In 14 cases of diabetes observed by the author no rise of blood sugar occurred during infusion of honey solution.

The effect of honey infusion on the myocardium is much superior to that of glucose infusion. The coronary blood supply is markedly increased, the heart rate is slowed down, and the amplitude of the blood pressure is increased.

A series of 76 patients undergoing major surgery of various kinds was treated preoperatively and postoperatively with intravenous infusions of different types of carbohydrates. Honey solutions proved to be far superior to all other sugars. The time necessary for preparation could be considerably reduced, the time of recovery after the intervention was spectacularly shorter, especially after operations for stenoses of the esophagus, cardia, and pylorus. Another advantage was that the patients treated with honey solutions did not suffer from disagreeable hunger sensations in the preoperative and postoperative periods. This applied especially to cases of pancreatitis and occlusive icterus in which no food was given by mouth for a period of 7 days without any sign of weakness or hunger. —*Werner M. Solmitz, M.D.*

Newer Aspects in the Treatment of Acute Anuria (Neuere Gesichtspunkte in der Behandlung der akuten Anurie). H. HEUSSER. *Chirurg*, 1955, 26: 145.

THE VERY FIRST CONSIDERATION in the treatment of anuria is, of course, the removal of the original condition which induced the failure or quiescence of kidney function. If this cannot be done, then the patient must be kept alive until kidney function is recovered. The author, however, accepts with a grain of salt the statement of an American writer who asserts that a patient with anuria can, and usually does, live for 3 weeks, if he is not permitted to die before this time from an iatrogenic water overload or a neglected hyperpotassium or acidotic blood reaction. Nevertheless, the author regards this statement as meriting earnest thought.

The various medical and physicotherapeutic measures as well as the operation of sympathectomy of the kidney are dismissed with the observation that although such efforts at times are accompanied by success there must always be kept in mind the possibility of spontaneous improvement.

Decapsulation receives more consideration; the author himself has had personal experience with this much disputed method of treatment and asserts that there will always be noted in the decapsulated organ (he himself has never in these instances decapsulated more than the one kidney) a resumption of the secretory function. Decapsulation results in a partial denervation of the kidney and may thus be especially indicated in instances of spastic anuria. The operation relieves pressure within the renal parenchyma in instances of parenchymatous swelling or of interstitial edema of inflammatory processes. According to Zollinger, this condition is present in the majority of cases of anuria. This operation should be done early, if it is to be done at all.

No matter what the general regime should be, however, the composition of the blood must be constantly watched, and this applies not only to the period of anuria itself, but also to the convalescence.

The rise of the nitrogen content of the blood can be combated by limiting the dietary intake of nitrogen-containing foods (proteins). Here one has the choice between the sugar and butter diet of Borst (*Lancet, Lond.*, 1948, p. 824), the sugar and oil diet of Bull (*Clin. Sci.*, 1950, 9: 379), or the zweiback and butter confiture method of Dérot. The azotemia, however, rises too high and too rapidly to be accounted for exclusively by the nitrogen component of the diet and seems to come in part from the tissue breakdown of the patient himself. This nitrogen source may be combated by the administration of testosterone, or by placing the patient in the condition of hibernation (Reubi, G., *Schweiz. med. Wschr.*, 1954, p. 523).

Acidosis may be combated by the administration of carbonates, alkalosis by the administration of salines, and hyperhydration by the restriction of fluids and a salt-free diet. The retention of fluids may be efficiently detected by the clinical signs of edema; however, it is

perhaps best watched by frequent weighing of the patient.

Of special significance, of course, is the potassium salt content of the blood. Both too high and too low amounts of potassium may result in death, usually a cardiac death. Hadorn and Riva have shown how the effects of potassium imbalance may be detected by means of the electrocardiogram (*Schweiz. med. Wschr.*, 1951). These effects on the heart seem to be diminished by frequent injections of calcium gluconate. The lack of sufficient potassium in the blood may be combated by the administration of this salt; the dangerous rise in the blood potassium must be combated by ion substitution methods, by means of the duodenal tube or by the artificial kidney.

By the conscientious application of the principles here discussed (unfortunately but the barest outline of such methods can be given) many lives will be saved for a sufficient period of time for the spontaneous recovery of the kidney itself.

—*John W. Brennan, M.D.*

The Impact of Emergency Surgery on Patients with Pre-Existing Disease. MARTIN ELLIOT SILVERSTEIN, THOMAS HODGE MCGAVACK, and JAMES M. WINFIELD. *Surg. Clin. N. America*, 1955, 35: 319.

THIS THESIS holds that the entire body is involved in the response to surgical trauma. Much of the response is defensive. Following a shock phase in which occur cardiovascular changes, hypothermia, acidosis, hemoconcentration, hypochloremia, hypoglycemia, deranged cell permeability, and loss of muscle tone, there is a phase of countershock. This begins with a discharge of epinephrine and norepinephrine. Both act to stabilize the deranged central and peripheral vascular controls, and the former, in addition, fires off the pituitary adrenocortical mechanism. This mechanism is subserved by the release of adrenal corticords which control the electrolyte metabolism, inflammatory reactions, the development of plasma antibodies, and the protein and carbohydrate metabolism. Recent reports suggest that the thyroid gland is activated early along with the adrenal medulla to provide a metabolic rise. The thyroid may be stimulated by hypothalmic neural or by pituitary hormonal mechanisms, and such thyroid activity is countered by the later rise of the adrenocortical mechanism. Following the phase of countershock there are the more specific reponses to the various stresses.

A successful defense by the patient undergoing emergency surgery requires a responsive nervous system, intact adrenal medullary, anterior pituitary, and adrenal cortical tissues, responsive arterioles, stores of liver glycogen, normal carbohydrate metabolism, and a maintained blood volume with sufficient extracellular fluid in a state of balance with the intracellular water and electrolytes. The absence of, or failure to, function of any of these mechanisms, which are activated one by another in turn, will be reflected by a deficient response in a particular phase, and by an excessive response in the phase which precedes it.

Certain diseases are characterized by impaired defensive mechanisms. One group has depleted target organs and tissues; another group has deranged regulating organs.

Depleted blood volume, dehydration states, starvation, and conditions of excessive losses of gastrointestinal electrolytes, all defeat the normal defenses to emergencies, each according to the various moieties in deficit. Preparation of the patient for surgery must include repair to the highest possible state of any or all deficiencies.

Of all the disorders of regulatory mechanisms a lack of adrenal tissue makes the patient most vulnerable when an emergency response is called for. Clinical and laboratory evidence of hypoadrenocorticism should be sought for before operation is undertaken in a surgical emergency, lest an addisonian crisis be precipitated. Such a patient is extremely sensitive to shocking stimuli, infection, and to the depressive effects of narcotic and anesthetic drugs. Adrenocortical substitution therapy should be given before an operation is undertaken; aqueous cortical extracts, cortisone, mineral corticoids, sodium chloride, water, and pressor amines should be administered in adequate dosages, and prophylactic broad spectrum antibiotics should be given.

Thyroid crisis is a variety of deranged reactions during the body's response to surgery. In that crisis the normal thyroid phase does not end with the appearance of the adrenocortical hormones, either because the thyroid response is excessive or because the adrenal response is deficient. Thyroid crisis occurs in two forms, the obviously hyperthermic and hypermetabolic syndrome, and the more insidious apathetic form. The latter may appear several days after operation, and reflects an inadequate or exhausted adrenocortical output. Thyroid crisis can be avoided by correcting hyperthyroidism before operations with antithyroid drugs. If it appears after an operation, treatment should include oxygen, cold packs, sedation, adequate water and electrolyte replacement, carbohydrates, sodium iodide, and adrenocortical hormones.

Diabetes mellitus is another disorder which leads to a deranged regulatory mechanism after acute trauma. The diabetic patient is prone to dehydration and electrolyte depletion, metabolic acidosis, malnutrition with hyperglycemia, and to infections. Each diabetic patient must be carefully adjusted and treated during surgical emergencies. Laboratory controls must replace reliance on what were previously established dietary and insulin requirements for that patient. Insulin, carbohydrates, and alkalinizing solutions should be given according to plasma measurements of sugar and carbon dioxide in the comatose patient, and according to fractional urinalysis in the noncomatose patient.

Hypothyroidism and hyperinsulism present other problems which must be managed according to demands and indications.

—*Leonard D. Rosenman, M.D.*

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Roller and Wringer Injuries; Clinical and Experimental Studies. MARTIN A. ENTIN. *Plastic & Reconstr. Surg.*, 1955, 15: 290.

THE AUTHOR analyzes the various factors involved in the production of wringer and roller injuries in labo-

ratory animals, and correlates these findings with clinical cases. The experimental studies were carried out on a large group of male rats and 8 dogs. A standard injury was inflicted by power-driven rubber covered rollers rotating at thirty-five revolutions per minute for 90 seconds, and with the compression force adjusted to cause an average loss of skin of 2 sq. cm.

Analyses of the swelling and edema ensuing after injury showed a progressive increase reaching a peak at 6 to 8 hours, and then gradually decreasing. Electrolyte studies on the muscle in the area of injury showed a loss of potassium of 20 to 8 per cent at 2 and 3 hours, respectively, but no consistent trend over the 48 hour period. The mean increase in the sodium content of this tissue ranged from 317 per cent at 2 hours to 243 per cent at 48 hours after injury. This resembles somewhat the findings in other types of injuries such as burn, prolonged ischemia, and frostbite. The loss of potassium is attributed to the direct damage to the muscle cells; the increase in sodium reflects the accumulation of interstitial fluid.

Doses of hyaluronidase equivalent to from 400 to 1,500 new tuberculin units for an adult man decreased the loss of skin. When a compression bandage was used in conjunction with the hyaluronidase the loss was increased, but this was due to the wetting, constriction, and maceration of tissue since these bandages could not be properly controlled in the laboratory animals.

Microscopic sections showed marked edema and extravasation of blood into the subcutaneous and subfascial tissues and between the muscle bundles followed by necrosis of the skin and late fibrous tissue replacement of injured muscle cells.

The mechanism of injury is caused by three forces —compression, rotation, and stripping caused by the rotating rollers sliding the soft tissue over the rigid bony structure of the limb, and also, by the efforts to extricate the limb. The degree of injury is determined by the gap between the rollers, the force of compression, the speed of rotation, the duration, the age of the victim, whether one or both rollers are geared to the motor, forcible attempts to extricate the limb, and the instillation of foreign bodies or chemicals into the wound.

The wounds are classified into compression and avulsion types. Compression may result in crushing or bursting injuries, while the avulsion may be either palmar, dorsal, or both (degloving) (Fig. 1).

For management of the compressing injuries, the following regime is recommended. The patient is hospitalized, and fractures are eliminated by means of x-rays. The injured limb is cleansed and treated with a mild antiseptic. From 150 to 500 new tuberculin units of hyaluronidase are administered and the dose is repeated the following day. A compressive bandage is applied; the arm is elevated and systemic antibiotics are administered. Localized accumulations of fluid, blood, or pus are evacuated and early skin grafting is performed for any extensive skin loss.

In the avulsion type of injury there is present a loss of tissue in addition to the findings of the compression injury. Here, the use of primary deformative reconstruction is recommended even in cases with associated tendon, bone, and joint injuries. Special effort

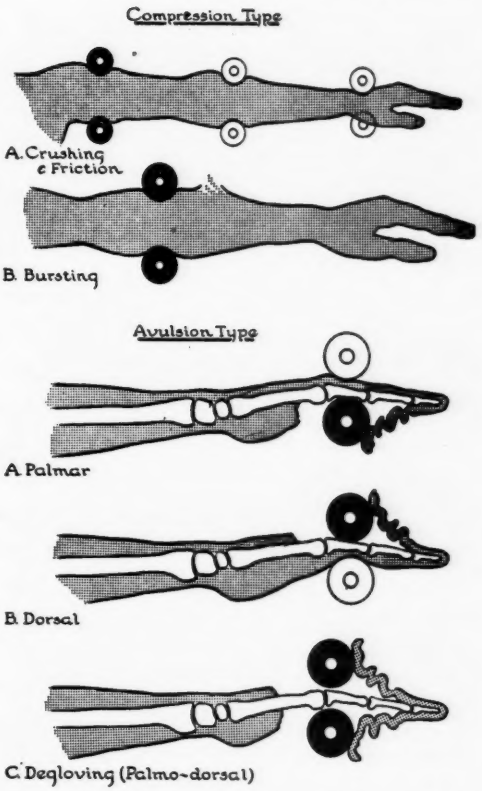


FIG. 1 (Entin). Clinical classification of roller and wringer injuries.

should be made to effect preservation of all viable tissues, closure without tension, and early motion. The initial closure may entail simple resuturing, shifting of the adjacent or distant skin flaps, or free skin grafting. Splinting in the position of function, prevention of infection, and early return to activity lead to the quickest rehabilitation. These principles are well illustrated by clinical cases. —*Carl Schiller, M.D.*

Causes of Burns in Children; a Study of Full-Thickness Burns in 457 Patients from the North Carolina Orthopedic Hospital, Gastonia. E. E. BLECK. *J. Am. M. Ass.*, 1955, 158: 100.

AN ANALYSIS was made of the causes of full-thickness burns in children seen at the North Carolina Orthopedic Hospital from 1921 to 1953. A total of 457 children, ranging in age from 6 months to 16 years, was seen during this period. The total of hospital days was a staggering 90,992 days.

The yearly incidence remained quite stable from 1930 to 1953.

The main causes of the burns were ignition of clothing from gasoline or kerosene; direct contact with

flame, hot ashes, and hot stoves; and hot liquids (water, grease). Forty-six per cent of the burns in the present series were due to the ignition of clothing, the source of the flame in the majority of instances being an open fireplace.

The author advances the thought that, with the improvement in manufacturing processes, clothing should be made fireproof. This, he feels, would be achieved if the public made such a demand.

—Ely Elliott Lazarus, M.D.

The Prognosis in Acute Infectious Diseases (La prognosi nelle malattie infettive acute). ROBERTO DE MATTIA. *Minerva med.*, Tor., 1955, 1: 993.

RECENT ADVANCES in chemotherapy of infectious diseases would seem to relegate the prognosis in these cases to a secondary importance. There are, however, certain aspects which should not be disregarded. It is important to evaluate the patient's defense which varies with age, sex, and his condition before harboring the infectious disease; the virulence of the infecting organism; and the interference of the therapy upon the immunological response.

The use of chemotherapy and antibiotics has brought on new pathological changes manifested by intolerance, idiosyncracy, allergic response, morbid changes due to excessive doses, and vitamin enzymatic changes due to prolonged therapy. All are not roses and flowers that germinate in the garden of chemotherapy.

There follows a discussion of the prognosis in acute infectious diseases, each one taken individually; this discussion covers twenty-four pages.

—Lucian J. Fronduti, M.D.

Cross Infection of Wounds with Antibiotic-Resistant Organisms. E. J. L. LOWBURY. *Brit. M. J.*, 1955, 1: 985.

THE AUTHOR discusses the frustration of chemotherapy by the spread of resistant organisms among the staff and patients, and points out the errors of excusing perfunctory asepsis on the grounds that the sulfonamides and antibiotics are available.

The two basic problems, prevention of emergence of resistant bacteria and the prevention of the transfer of bacteria, especially of resistant strains, from the environment to the patient are considered. Three procedures may help to prevent or delay the emergency of resistant bacteria: (1) economy in the use of chemotherapeutic agents; this implies not only restricting their use for cases in which they are specially indicated, but also giving them in sufficient amounts to achieve a complete effect in the shortest possible time; (2) avoidance of agents which readily induce resistance, especially streptomycin, when other agents will do as well; and (3) the use of two or more agents together. This third method has been vindicated in the treatment of tuberculosis by combinations of streptomycin, para-aminosalicylic acid, and isoniazid. If the resistant organisms emerge by the selection of mutants, the use of two unrelated antibiotics will provide a barrier against the emergence of any mutants except those in which resistance to both antibiotics has been acquired at the same time, and the proportion of all divisions which give rise to such double mutation is likely to be exceedingly small. Moreover, two unrelated antibiotics used together will interfere with different metabolic processes and so reduce the chances that the organism will establish an alternative metabolism to the one which has been blocked. Combined therapy may be associated with synergistic action and thereby enhance the bactericidal effects of one agent by combination with other agents.

The fact that antibiotic-resistant organisms, especially staphlococci, cause added infection in wounds in hospital patients has emphasized the limitations of chemotherapy and of hygiene applied in this field.

Emergence and spread of resistant organisms are considered as separate problems. To combat emergence of resistant organisms, efficient dosage and the combination of two or more agents has been advocated. In the author's experience the application of neomycin and of hibitane has had some prophylactic effect against staphylococci in burns, which so far has not been accompanied by the emergence of any resistant strains.

Methods to control the spread of bacteria by air and by contact have been developed considerably in recent years, but more knowledge of their performance is needed. Some further improvements are suggested; for example, the general use of positive-pressure ventilation with filtered air for operating theaters and dressing rooms. For the more complex task of limiting the transfer of infection in the ward, many changes in hospital design and in the nursing routine require investigation. *—John H. Mohardt, M.D.*

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Epiesophageal Cancer with Special Reference to Tumors of the Post Cricoid Region. M. LEDERMAN. *Brit. J. Radiol.*, 1955, 28: 173.

THE AUTHOR discusses the classification of a group of tumors that have caused considerable confusion in both classification and management in the literature.

On the basis of his experience he suggests that the term "epiesophageal cancer" include those tumors arising in (1) the cricopharyngeal area, (2) the pharyngoesophageal area, and (3) the cervical esophageal area. For purposes of classification he includes the term "epi-esophagus" to be defined as being limited superiorly by the upper border of the posterior lamina of the cricoid cartilage and inferiorly by the plane passing from the upper border of the manubrium sterni to the midpoint of the second dorsal vertebra.

The author indicates that cancer arising in these areas may be differentiated into subgroups by the following methods of investigation: (a) clinical, (b) radiologic, (c) response to radiation.

The clinical examination must include a very careful history. The author discusses several differences in the history and length of duration of symptoms of the various subgroups. The clinical examination is stressed and must include careful mirror, as well as direct examination of the pharynx and larynx. Biopsy studies are stressed.

The radiologic examination, as mentioned by the author, must include at least (1) lateral soft tissue radiographs of the neck, (2) tomography, (3) barium swallow and barium mucosal relief studies.

The author also discusses the response of various tumors in this area to radiotherapy, indicating that disappearance of a lesion in the range of a laryngeal mirror during treatment is usually pathognomonic of an origin below the cricopharyngeal sphincter. He indicates that tumors of the cricopharyngeal region are radiosensitive and that tumors of the cervical esophagus can be radiosensitive, and when the disease is localized and has not extended upward to the larynx or downward into the mediastinum that a satisfactory result can be obtained. It is frequently difficult to differentiate between actual primary tumor and secondary infiltration. The author indicates that under radiation therapy this differentiation can usually be made since direct extension of the tumor nearly always disappears, while infiltration rarely shows marked response. —*Moris Horwitz, M.D.*

Hiatus Hernia, Hiatus Insufficiency, and Cardiac Insufficiency (Hiatushernie, Hiatusinsuffizienz und Kardiainsuffizienz). UMBERTO COCCHI. *Fortsch. Roentgenstrahl.*, 1955, 82: 184.

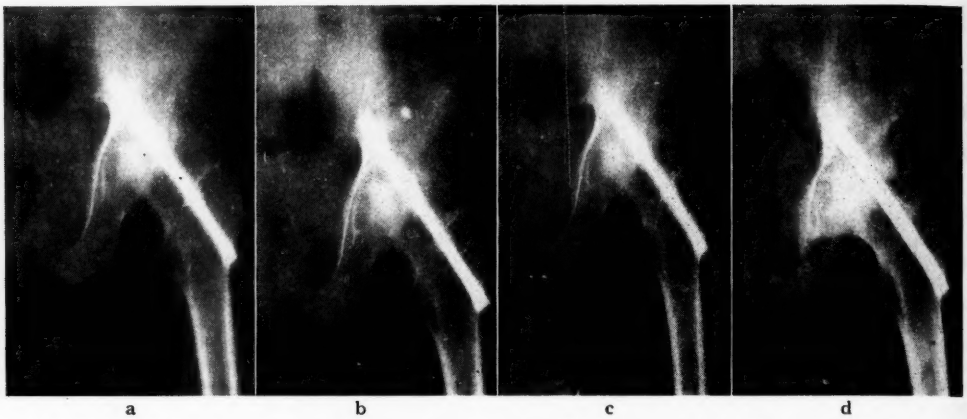
IN THE LOWER THIRD of the esophagus there are present two mechanisms of closure. The first of these is located at the so-called hiatus and is produced by the diaphragmatic musculature adjoining the hiatus through which the esophagus passes from the thoracic to the abdominal cavity. This constitutes the so-called superior diaphragmatic cardia of Ander and Bahrmann, Reich, and Lerche. The second mechanism is located at the aperture of entrance to the stomach cavity and has been designated the inferior anatomic cardia. It is at this latter place that the esophageal mucosal pattern passes over into that of the stomach. Between these two sphincters lies the antrum cardiacum.

Either one, or both, of these mechanisms may be insufficient and both lead to a clinically indistinguishable (roentgenologically) symptomatic picture. By the term "cardiac insufficiency" is meant the insufficiency of the superior cardiac diaphragmatic sphincter, and by the term "hiatus insufficiency," that involving the lower or anatomic cardiac sphincter. Except by means of the esophagoscope, the mucosal pattern of the esophagus cannot be distinguished from that of the stomach; that is, the long slender lines of roentgen opacity may be imitated perfectly by those of the stomach mucosa in the sliding hernia. The same may be said of the paraesophageal types of hiatus hernia when the conditions of pressure and size of the hernia are favorable.

In such conditions as senile resorption of the fatty tissue occluding the hiatal opening from below, the membranous closure of the esophageal hiatus may be sufficiently lax to permit of considerable intrusion of the stomach into the thoracic cavity above the diaphragm, without there being present a true hiatus insufficiency. On the other hand, there may be present a cardiac insufficiency without the presence of hernia. In both these conditions the distribution is the same in all age groups and in both sexes. The diagnosis can only be made roentgenologically, and only by means of a careful study of the manner of passage of the contrast material through the hiatus in various projections.

In the clinic of Schinz, at Zurich, Switzerland, the exposures are made with the patient in the upright position, in dorsal decubitus, and in the Trendelenberg position, and with elevation of first the right and then the left side. By this means, since 1951, hiatus insufficiency has been found much more frequently, and the number is still increasing. These insufficiencies are now encountered in about 1 per cent of all roentgenologic examinations of the stomach. This figure compares favorably with the 3 per cent reported by Evans (Am. J. Roentg., 1952, 68: 754), the 4 to 5 per cent reported by Baensch in Washington, D.C. (U. S. A.), and the 6 per cent reported by Hafter (Schweiz. med. Wschr., 1954, p. 266).

As a result of the variegated symptom picture, which does not always give a clear diagnosis, the routine use of this method of procedure is indicated in all patients who complain of anginoid pains, or of pains in the region of the upper portion of the digestive tract. In the hiatus hernia there is always a filling with contrast material of the herniated portion of the stomach from the direction of the stomach it-



a b c d

FIG. 1 (Speed, Brackin). a, Postoperative tomogram October 17, 1949, at a depth of 8 cm. showing position of nail in ilium, abduction of femur and bony fusion across the old hip joint at this level. b, Tomogram at 9 cm. showing continued evidence of position and bony fusion. c, Tomogram at 10.5 cm. showing corroborative evidence of fusion. d, Tomogram at 11 cm. Note full shadow of the iliac flap turned down. Solid union.

self; in cardiac insufficiency there is a dilatation and filling of the lowermost portion of the esophagus with material regurgitated from the stomach, but observed as though coming down from above.

—*John W. Brennan, M.D.*

Use of the Tomogram After Attempted Joint Fusion. KELLOGG SPEED and ROY E. BRACKIN. *Am. J. Surg.*, 1955, 89: 872.

SIR JOHN TOMES, in 1889, first described the tomogram, which has been used by the authors for years to determine osteogenesis and bony union after attempted operative fusion of the joints or nonunion. Orthodox roentgenograms may give false information leading to the injudicious use and breaking down of early incomplete fusion.

In combining external and internal operative fusion of the hip joint, for example, the head of the femur and acetabulum are denuded of cartilage followed by the turning down of a strip of bone from the ilium into the split trochanter, and an over long Smith-Peterson nail is inserted for fixation through the neck and head of the femur on into the ilium at a proper angle of abduction. The patient is then immobilized in a plaster of paris spica for 3 to 4 months. A bone transplant can be used but requires more operative time and is liable to fracture.

Four cases of a series of 21 in which the tomogram was the deciding factor in determining fusion or nonfusion are cited in detail.

It is concluded that the tomogram is useful in the diagnosis of any joint injury and disease, after surgery to determine osteogenesis, nonunion, or union, in the search for sequestra or foreign bodies, and to help the surgeon establish a safe start in weight-bearing. It also may be a determining factor in medicolegal disputes and has lately been adopted in the diagnosis and prognosis of thoracic and spinal lesions.

The Significance of the Shift in Serum Protein Content in the Diagnosis of Bone Tumors (Ueber die Bedeutung der Verschiebungen im Serumeiweissgehalt bei der Diagnose von Knochentumoren). BÉLA GIMES AND ZOLTÁN SZENDRÖI. *Fortsch. Roentgenstrahl.*, 1954, 81: 567.

THIRTY-NINE PATIENTS with bone pathology were studied by the authors. Of these, there were 9 with benign bone tumors, 21 with malignant bone tumors, and 9 with inflammatory processes simulating sarcoma. The malignant and inflammatory cases were patients observed at the roentgenologic and urologic clinics of the University of Budapest; the patients with benign lesions were referred to the authors by the Orthopedic Department of this institution.

The determinations of the blood serum fractions were made with the ordinary blotting paper method of electrophoresis. Three tables in the original text show the electrophoretic figures for the three groups of bone lesions studied.

Under normal conditions, i. e., in the absence of inflammation, the albumin-globulin ratio oscillated between 1.0 and 1.6, and the globulin fractions showed nearly normal values in the group of benign bone tumors. This finding is of particular significance in the diagnostic distinction between the benign osteoclastoma (giant cell tumor of bone) and bone sarcoma, as these two conditions develop in similar locations and present similar clinical, morphologic, and roentgenologic pictures.

With regard to the malignant tumors, serum protein determination was found to be especially valuable as a means of diagnosis. The characteristic electrophoretic curve was verified by a histologic biopsy in each instance.

In the primary malignant bone tumors, under normal conditions, the albumin-globulin quotient was lowered and the alpha-2 and beta fractions were in-

creased. Under roentgenologic treatment, as soon as the irradiation dermatitis appeared, a change occurred in the relationships with a relative increase in the titer of the gamma globulin. In 2 instances in the authors' material, upon irradiation therapy of the primary malignant tumor, the titers all returned not to the pre-irradiation values, but to normal after regression of the irradiation dermatitis. In these 2 instances a subsequent biopsy failed to demonstrate the presence of malignant cells.

In the metastatic bone tumors the albumin-globulin quotient was lowered and the alpha-2 and beta fractions were increased. This relationship was maintained after the primary tumor had been removed and was so pronounced as to be recognizable even after the advent of a catarrhal cystitis.

Of greatest significance was the ability of the atypical sarcoma to simulate osteomyelitis electrophoretically. Since the introduction of the antibiotics there may develop peculiar osteoperiosteal lamellation and other changes, suggestive of sarcoma, in osteomyelitic cases. In these cases the clinical response to therapy and the increase in the gamma globulin in the electrophoretic examination assume a decisive significance.

Although the authors' experience is still too meager to permit of final judgment, it is sufficient to allow the statement that electrophoresis, together with the other clinical and roentgenologic diagnostic methods, is an easily applied and valuable adjunct in the differential diagnosis of bone pathology.

—John W. Brennan, M.D.

Considerations with Reference to Thrombosis of the Carotid Artery in the Neck; with Particular Attention to the Development of a Collateral Circulation (Considerazioni sulla trombosi della carotide al collo; con particolare riguardo al circolo collaterale). ANTONIO TOTI. *Radiol. med.*, Milano, 1955, 41: 321.

FIVE INSTANCES of thrombosis of the carotid artery, diagnosed by arteriography (angiography), are here reported. This series of 350 cases of this condition is part of a material angiographically examined since 1950.

The first patient was a 42 year old male who had been at times suffering from attacks of paresthesia, disturbed vision, and roaring in the left ear. Suddenly, 10 days before he presented himself, a paresis of the upper right extremity developed, the paretic condition tending to extend down into the lower extremity of the same side.

Objectively there could be demonstrated a hypertonia and increased reflexes in the upper right extremity, the hand on this side being maintained in a closed fist position. There was also some increase in the reflexes of the lower right extremity. The blood pressure was low. The eye grounds appeared normal; however, the pressure in the retinal artery of the right eye dropped from 40 to 10 when the right carotid artery was compressed; the pressure in the left eye, in the meantime, remained unchanged.

Percutaneous arteriography of the left common carotid artery disclosed, immediately above the bifurcation, complete occlusion of the internal carotid, the external carotid appearing definitely enlarged and

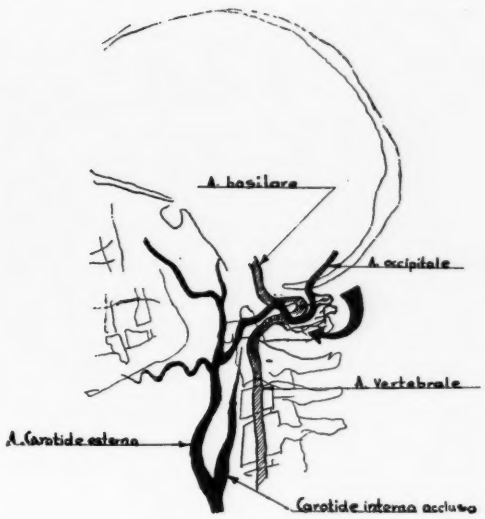


FIG. 1 (Antonio Toti).

strongly shadowed. Arteriography of the right side showed filling of nearly all of the cerebral vessels on the occluded side, the circulation coming from the nonoccluded side by way of the anterior communicans artery. Immediately following the last procedure the left frontal headache disappeared as though by magic and the patient was again able to move the fingers of the right hand and, to some extent, the right arm.

The second patient was a 62 year old male who, 16 days before presenting himself, was seized with clonic spasms of the left leg. This attack was followed by some loss of strength in the affected extremity and a transitory difficulty in speech and deficiency of the facial nerve developed. At this time the patient noted pains in the right temporal region, radiating to the ear and side of the neck. The reflexes were increased in the left upper and lower extremities, the Mingazzini test was positive, and the blood pressure was 180/110.

Arteriography of the right common carotid disclosed filling of the right external carotid and occlusion of the internal carotid. Injection of the controlateral common carotid, here again, showed an evident collateral blood supply to the brain on the occluded side. The diagnosis of occlusion of the internal carotid artery was aided by the demonstration of lowered pressure in the central retinal artery in the eye of the occluded side.

The third patient was a 50 year old male who complained of headaches and paresthesia of the left upper extremity, with moderate diminution of strength in this limb. There was present at examination intellectual debility, depression of mood, and affective disturbances. There was present objectively an assymetry of the deep reflexes with predominance of the left side. Here again angiography disclosed occlusion of the right internal carotid artery, the external carotid on

this side filling, and being apparently of more than normal size. The angiogram after 2 minutes disclosed filling of the cerebral vessels and upper portion of the internal carotid on the occluded side, the blood coming from the external carotid by way of the maxillary and ophthalmic arteries.

The fourth patient was a 43 year old male who had been suffering for several years from hemicrania on the right side. Upon returning from a tour on bicycle, he experienced violent pains in the right temporal region with loss of consciousness for about an hour and subsequent hemiparesis on the left side. The hemiparesis disappeared, leaving a mild type of hemipyramidalism with paresthesia on the left side. The angiogram on the right side disclosed an occlusion of the right internal carotid artery with findings comparable with those of the immediately preceding case. Injection of the vertebrobasilar system with 30 per cent umbradil showed a passage of blood to the vertebral vessels of the occluded side, evidently by way of the posterior communicating artery.

The fifth patient was a 42 year old male with a mitral lesion and cardiac fibrillation. A year previously he had suffered a short period of motor deficiency on the left side. For the past month he had noted frontal headaches on the right side, progressive loss of force of the extremities on the left side with paresthesia, and some loss of sensation. The reflexes on this side were increased; on examination there was present a flaccid hemiplegia.

The angiogram with 10 c.c. of 30 per cent umbradil injected into the right carotid disclosed a progressive narrowing of the right internal carotid to the point where it disappeared at the level of the first cervical vertebra. This appearance suggested a partial canalization of a thrombotic process. Two minutes later the angiogram disclosed the collateral circulation through the occipital branch of the external carotid artery to the vertebrobasilar system of vessels, together with some passage of blood through the vertebral artery to the posterior cranial fossa (Fig. 1).

The sixth patient was a 49 year old male who, 3 months previously, noted paresthesia of the left side of the body followed by paresis and the development of a cubital claw-hand on the left side. The reflexes on the left side were hyperactive and the Mingazzini test was positive. The percutaneous angiogram on the right side disclosed an occlusion of the right internal carotid artery at the level of the carotid sinus. The intracranial vessels on the right side filled through the maxillary artery which appeared to be enlarged and irregular. Following the injection a brief Jacksonian crisis developed and a temporary controlateral Babinski reflex occurred. The left side was not injected.

From his experience with this series of cases and from his perusal of the literature, the author believes that the arteriogram is, when proper precautions are used, not harmful, even in patients with a precarious general condition, as in case 5 of the series reported, and that the arteriogram is the only means of certainly diagnosing this form of arterial occlusion in the presence of deceptive clinical symptoms.

—John W. Brennan, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Capillary Hemangiomas of the Skin. JOHN J. MODLIN. *Surgery*, 1955, 38: 169.

THE AUTHOR discusses the follow-up observations in a group of untreated capillary hemangiomas. Between January 1947 and May 1954 a total of 42 children with 52 hemangiomas were examined and followed at regular intervals. Twenty-five of the 52 lesions involved the face, neck, or scalp; 17 were located on the extremities; and 10 were on the trunk. Thirty-one of the 52 lesions received no treatment of any kind; 11 were excised surgically; and 10 lesions received "token" irradiation in order to placate anxious parents and to prevent more vigorous treatment elsewhere. Of the 42 patients, 3 were lost to follow-up. Of the remaining 39, complete regression has occurred in 24 (61%), and definite and continuing regression is occurring in 14 of the 15 remaining patients. In no case was there evidence of progression of the hemangioma after 1 year of age, nor was there destruction of features, serious hemorrhage, or loss of life.

The author believes that the ideal treatment of infantile capillary hemangiomas consists of destruction or surgical excision early in life, before the characteristic rapid growth occurs. The fact remains, however, that many lesions will be seen after enlargement has occurred, and it appears that these may be followed closely without treatment. He believes that judicious restraint may produce a much better end result than that following well meant but vigorously applied destructive methods of treatment. He asks for additional reporting of conservatively managed cases in order to determine the true natural history of these lesions.

—Ely Elliott Lazarus, M.D.

Dyschondroplasia and Hemangiomas. (Maffucci's Syndrome). WILLIAM BENNETT BEAN. *Arch. Int. M.*, 1955, 95: 767.

THREE NEW CASES of Maffucci's syndrome are reported by the author bringing the total to 30 cases of the disease now on record. The syndrome is described, in brief, as an inborn dysplastic mesodermal anomaly in which dyschondroplasia and vascular hemangioma (angioma, phlebectasia, and hamartoma) occur together. The disease may be suspected very early in life when unusual hemangiomas of the skin do not regress or disappear. In childhood, the dyschondroplastic disorder may cause various deformities and pathologic fractures. The curious association of dyschondroplasia and hemangioma and the devastating deformity which makes the victim a tragic caricature is associated with a high incidence of malignant neoplastic change.

The several kinds of malignant tumors to which different victims of Maffucci's syndrome have succumbed —chondrosarcoma (4 cases), angiosarcoma (1 case), malignant lymphangioma (1 case), glioma (1 case), and ovarian tertoma (1 case)—demonstrates this high risk of malignant neoplasm. The main problems posed by Maffucci's syndrome concern the relationship between the disorders in two separate tissues. Does the vascular lesion determine the dyschondroplasia, or are the two produced by some other mechanism, probably a genetic one?

The author suggests that the 3 cases which he reports, all occurring in one hospital, possibly suggest that the disease is less rare than the few case reports on record would indicate. It is also suggested that patients with only dyschondroplasia (Olliers' disease) or only vascular hamartoma should be studied for disorders of the other, apparently unaffected, tissues to provide a better understanding of this disorder.

—Edmund A. Gorvett, M.D.

Chemotherapy of Solid Tumors with Triethylene Thiophosphoramide. JEANNE C. BATEMAN. *N. England J. M.*, 1955, 252: 879.

N-N'-N"-TRIETHYLENE THIOPHOSPHORAMIDE is a sulfur derivative of triethylene phosphoramide, a polyfunctioning alkylating agent belonging to a group that includes nitrogen mustard and triethylene melamine.

The clinical effectiveness of triethylene thiophosphoramide was first reported by Shay *et al.* in 1953. Forty-nine patients with leukemia and allied diseases were treated with this compound. Although beneficial effects were noted in lymphoma, sarcoma, and Hodgkin's disease, the best results were achieved in the patients with subacute and chronic leukemia.

The present report confirms the observation of Shay *et al.* on human mammary carcinoma, and describes the results in patients with far advanced neoplasms of various sites and cell types.

Ninety-nine patients with far advanced cancer are included in this series. The compound was administered by the intramuscular, intravenous, intra-arterial intrapleural, intraperitoneal, and intracranial routes, as well as directly into the tumor. In addition, in one case it was injected into the pericardium, and in another it was instilled into the bladder. These various routes were employed to concentrate therapy at the site of disease that appeared to offer the greatest threat to the patient's welfare. Individual doses ranged from 5 to 40 mgm., depending on the size of the patient, size of the tumor mass, hematologic picture, and clinical response. Total doses ranged from 30 to 383 mgm., given over a period of 1 week to 44 weeks. When objective manifestations of disease were minimal or absent, intervals between therapy were prolonged to 3 weeks, but recurrent symptoms were seen with longer intervals, so injections were given routinely at least every 3 weeks, the white-cell count permitting.

Clinical side-effects were rare, a transient febrile reaction occasionally being seen. Local anesthesia prevented pain at the site of injection into a very hard tumor mass. The limiting factor in therapy was hematopoietic depression, manifested by leukopenia and occasionally thrombocytopenia. Maximum leukopenia occurred from 2 to 3 weeks after treatment had

been discontinued. A rapidly falling white-cell count indicated the necessity of reducing or temporarily discontinuing the drug.

From the observations in this series of cases, mammary and ovarian carcinoma appear to be sensitive to doses of triethylene thiophosphoramide tolerated by the human patient. Objective regression of disease, including decrease or disappearance of soft-tissue masses, healing of ulcerations, recalcification of bone lesions, disappearance of neurologic manifestations, and control of effusions was noted in 28 of 34 patients with far advanced carcinoma of the breast. Objective improvement, consisting of decrease in palpable tumor masses and control of effusion, was observed in 10 of 12 patients with far advanced ovarian carcinoma.

Patients with tumors of the central nervous system showed varying degrees of response. Tumors of the gastrointestinal and urinary tracts, of the lung, the head, and the neck were much less sensitive to triethylene thiophosphoramide, and yet in these groups some palliation was observed.

The effectiveness of therapy appeared to be related to the route of drug administration. Local administration frequently had not only a marked local effect, but also had some effect on distant disease in sensitive tumors. Pleural effusions were controlled for weeks to many months by the instillation of triethylene thiophosphoramide into the pleural cavity. The accumulation of peritoneal fluid was slowed and the findings in one case suggested that pericardial fluid secondary to neoplasm may be controlled by local administration of the drug.

The author concludes that the drug appears to be a useful palliative agent, especially in the treatment of mammary and ovarian carcinoma.

—*Robert Paradny, M.D.*

Sacrococcygeal Chordoma; Its Surgical Treatment. Richard T. Shackelford and C. Martin Rhode *Ann. Surg.*, 1955, 141: 952.

The characteristics of sacrococcygeal chordoma would suggest surgical curability, yet there are no reported cures. The lesion, of notorchord origin, with greatest incidence in the sacral region, grows slowly, infiltrates adjacent soft tissues, and metastasizes late in its course, if it does at all. The relation of trauma to the appearance of the lesion is moot. The lesions may develop during any period of life, but are more common in late middle age, and twice as common among males as females. The tumors cause pain and tenderness, and more often present a mass within the pelvis than dorsal to the sacrum. They are radiotranslucent and cause destruction of the sacrum, with expansion of the cortex, and trabeculation within the mass.

Irradiation therapy is ineffective, except to relieve pain. Surgical excision of primary or recurrent tumors has yielded the longest survivals, (the average is about 8½ years). There are isolated cases of 16 and 13 year survivals, the last living now without evidence of disease.

It is thought that the technique of excision along the plane of the tumor capsule explains in part the failure to eradicate the growths. Additional cause for failure is the arbitrary transection of the sacrum, before investigation of the spread of the tumor within the spinal canal.

A radical excision of the tumor with surrounding normal soft tissue and a liberal amount of bone should give more hope of cure. The first sacral vertebra should be spared, to stabilize the pelvis, and both of the second sacral and at least one of the third sacral nerves should be preserved to permit normal excretory functions. The approach of McCarty *et al* is advised, viz., a one stage operation in the prone jack-knife position through a vertical midline incision, which permits blunt dissection between the tumor and the rectum, and exploration of the sacral canal.

Two male patients, 42 and 47 years old, have had treatment as described above. The first had a small recurrence 2 years after the primary excision, and he has had no notable regrowth in the 6 months since then. There is some slight neural defect of sensation and bladder and bowel control. The recurrence in the second patient, one year after the primary operation, seemed to stem from inadequate excision of the sacrum. After reoperation he remained well, albeit the follow-up was brief. —*Leonard D. Rosenman, M.D.*

Prepubertal Malignant Melanomas; Report of 2 Cases. Leonard Dobson. *Am. J. Surg.*, 1955, 89: 1128.

The author presents 2 cases of malignant melanoma of the skin in children. Malignant melanoma in children is rare; however, many reports appearing in the literature emphasize the benign course taken by melanomas in infancy and childhood, and also note the fact that in children melanomas may appear malignant histologically but not clinically. In 1954, McWhorter and Woolner pointed out that the good prognosis accorded malignant melanomas in childhood was due to the fact that, in the earlier literature, benign juvenile melanomas and rare malignant melanomas had been grouped together.

After a careful study of reported malignant melanomas in childhood, the author states that these tumors behave like malignant melanomas in adults except that the prognosis is worse in children.

Because clinically it is usually impossible to differentiate malignant melanoma from juvenile melanoma, or even, at times, from an active junctional nevus, it is important to have a high index of suspicion and to think of the possibility of malignancy in any rapidly growing, easily traumatized or ulcerated lesion, deeply pigmented or not, which does not improve within 2 weeks on the usual protective treatment.

The lesion should be excised with a margin and then examined microscopically. If the lesion is a junctional nevus or juvenile melanoma, no further treatment is necessary. If it is a malignant melanoma, a radically wide local excision, usually requiring a skin graft, should be performed. The author advocates a radical block regional lymph node dissection in every case without distant metastases, whether the nodes are enlarged or not. If the primary tumor is near the regional lymph nodes, the local excision and node dissection should be done in continuity. Melanomas should not be biopsied and should always be excised for microscopic examination.

Congenital giant hairy nevi have been thought to be benign lesions and have, in the past, been cauter-

ized, excised piecemeal, or removed in layers with a dermatome. The author collected 4 cases of malignant melanoma arising in benign giant hairy nevi and reports one of his own. All 5 patients died, and in 3 there were multiple foci of malignancy. Thus, it is advisable to remove them as early and as completely as possible. They should be followed and widely excised at the earliest sign of malignant change.

—*Robert Paradny, M.D.*

Malignant Melanoma; 10-Year Results Following Excision and Regional Gland Resection. WILLIAM S. MCCUNE and GORDON S. LETTERMAN. *Ann. Surg.*, 1955, 141: 901.

THERE IS LESS uncertainty as to the diagnosis and the best means of treatment of melanomas than in the etiology and histogenesis of the lesions. The local lesion should be widely excised, either if known to be malignant, or if thought to be a benign precursor of melanoma. The place of regional lymph node dissection in the plan of treatment is not so firmly established. This report illuminates that problem.

Of 40 patients with melanoma, 4 had advanced disease; no operations were performed. The 36 other patients were subjected to single or multiple regional lymph node dissections, in addition to wide excisions of local lesions. In some, when the position of the melanoma favored it, the strip of tissue between it and the node-bearing area was excised also. In 22 patients palpable nodes were removed. In 20 of them the nodes contained metastases, and of the 20, one has survived for 5 years, and 3 have survived for 2 years. Five of the 7 in whom no metastases were encountered have survived 10 years.

The discussors of the present report included: Alton Ochsner who reported the use of TEPA in incurable cases; Gilbert Horrax who cited the case of a patient who has survived 7 years after removal of cerebral metastases of melanoma; Grant Ward who cited an example of palliation by x-ray therapy and his disappointment with TEPA; and S. Upchurch who decried the use of dissections in continuity in certain areas of the arm. —*Leonard D. Rosenman, M.D.*

The Evolution of Scientific Concepts of Cancer (Krebs im Wandel wissenschaftlicher Begriffsbildung). A. DIETRICH. *Deut. med. Wschr.*, 1955, 80: 807.

VIRCHOW'S views no longer adequately serve to explain tumors. Tumors are anomalies which are not subject to the normal regulation of the body to the same extent as normal tissue for the purpose of preservation of form and function. In the normal organism, cellular correlations appear early in the development of the body, and form and function of the organism appear as a unit. The break in unity may vary up to complete loss of form in cancer.

The therapy of cancer is not limited merely to the removal of the tumor, since many countervailing forces exist in the body against the neoplasm. Thus, catabolism of cancer cells that were swept into the lungs has been demonstrated. The presence of a growing primary tumor has an inhibitory effect on metastases. The role of estrogens in prostatic cancer and of androgens in mammary carcinoma is well known. However, the neoplastic transformation of a choristoma to a choristoblastoma, or of a hamartoma to a hamartoblastoma may require for its initiation simply a change in the correlations in the endocrine system. Hypophyseal and adrenal adenomas (Cushing's syndrome) may be construed as anomalies on an endocrine basis.

Tissue proliferation may also result from resorptive and reparative processes, from giant cell epulis of the jaw which can scarcely be distinguished from brown giant cell tumors, or from changes in the fat and protein metabolism (xanthomas, myelomas). Pregnancy may induce changes in the thyroid.

The histologic appearance of the cell does not permit an evluation of its malignancy and cytodiagnosis is valid only under certain definite conditions. Thus, hypernephromas of the kidneys have their origin in a collection of quiescent cells of the kidney capsule but can not be distinguished morphologically from the early metastasizing Grawitz tumors. Even in advanced malignancy the structural form of the organ may be maintained in some areas of the tumor. The character of the cancer is dependent on the interaction of the tumor cells and connective tissue.

Although little is known of them, a study of the forces of the body working against the autonomy of tumors is most urgent and would open new possibilities towards effective therapy.

—*Sidney Smedresman, M.D.*

The Implantation of Cancer—an Avoidable Surgical Risk? LAUREN V. ACKERMAN and MYRON W. WHEAT, JR. *Surgery*, 1955, 37: 341.

SEVERAL well authenticated cases of implantation of cancer at the time of a surgical operation are cited.

A well differentiated adenocarcinoma of the ampulla of Vater was resected from a 60-year-old man. Two and one-half years later, when a ventral hernia was being repaired, a nodule of the same tumor was found implanted in the region of the ligament of Treitz.

In a 75-year-old man, the sigmoid colon was resected for carcinoma. Eighteen months later a recurrent tumor in the anastomotic suture line was resected.

In a 43-year-old woman a thyroid tumor, thought to be benign, was enucleated. Seven years later a subcutaneous nodule appeared. A simple thyroid nodule should be treated by excision of the lobe.

If the capsule is ruptured, mixed tumors of the salivary glands are particularly apt to become implanted. Parathyroid cancer also may be implanted, and in one such case of the authors death resulted.

Soft tissue and bone sarcomas may be implanted, if not excised with adequate margins of normal tissue. In this connection, biopsy is of value to establish a diagnosis which will thus permit an adequately radical operation to be planned in advance.

Needle biopsy may be followed by implantation along the needle tract. Among the authors' cases this occurred in one patient with squamous carcinoma and in another with malignant melanoma. However, if needle biopsies are well planned, the needle tract will be excised along with the involved organ, and regrowth of the tumor cannot take place.

Skin grafting must be done with great care so that malignant cells are not implanted in the donor area. —*Frederick W. Preston, M.D.*

Fibrosarcoma of the Extremities; Review of 45 Cases.
H. H. BRINDLEY, CHARLES PHILLIPS, and JUAN N. FERNANDEZ. *J. Bone Surg.*, 1955, 37-A: 602.

THE PRESENT report is based on a study of 45 cases of fibrosarcoma of the extremities. These tumors were seen within the period from 1930 through 1952; the majority (35) were seen before 1938. The authors graded the tumors as follows: grade 1, 15 cases; grade 2, 12 cases; grade 3, 7 cases; grade 4, 11 cases. It is believed that connective tissue adjacent a fibrosarcoma may undergo malignant change. The tumor arises from fibroblasts, has a pseudocapsule, and may show areas of degeneration. Several types of benign lesions may be mistaken for fibrosarcomas, viz., contracture of plantar or palmar fascia.

The incidence is reported as 0.19 per cent of all admissions, and 5.4 per cent of soft tissue tumors. Trauma is mentioned frequently as an etiologic factor, but is most often considered as coincidental. Fibrosarcomas have been reported as forming in scar tissue, and x-radiation of benign lesions may induce sarcoma; spontaneous transformation may occur, as was suggested in one of the cases studied; malignant sarcomas may be present at birth.

Twenty per cent of the patients whose cases are reported had a family history of malignancy. The average age at onset was 45 years, with about equal sex incidence. Fifty-one per cent of the tumors appeared on the thighs, and 62 per cent appeared in the lower extremities. The most frequent symptom was the development of a mass (84%). This was followed by pain in about 25 per cent of the cases.

Fibrosarcoma should be considered in the differential diagnosis of any soft tissue mass of the extremities. This tumor may metastasize to many places, but most frequently to the lungs. Metastasis to the lymph nodes occurs only rarely. The primary lesion may have very little tendency to distant spread. Recurrences of the lesion develop in about 55 per cent of the cases.

The prognosis seems to be better in females. There were 5 year cures in 72 per cent of females as compared to 53 per cent in the males. In a study of various survival groups, it would appear that sex, age, and location of the tumor have no bearing on prognosis. Generally, the lesser the grade of anaplasia, the better the life expectancy.

Treatment of these lesions is surgical. Early radical removal is highly desirable. Local radical removal is advised for grade 1 and grade 2 lesions. For tumors of higher grade malignancy, amputation is recommended.

—*Richard L. Lawton, M.D.*